Systematic Review on Effectiveness of shoulder taping in Hemiplegia

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Background: Shoulder pain and subluxation are the commonly encountered problems among subjects with hemiplegia. Rehabilitating the shoulder following stroke is a challenging task among physiotherapists in rehabilitation set up. There is a need to validate the effectiveness of externally applied taping materials in hemiplegic shoulder. *Objective:* This systematic review analyses the efficacy of taping on hemiplegic shoulder in terms of alleviating pain and managing subluxation. *Methods:* Systematic review of randomized controlled trials (RCTs) was conducted to determine the effects of taping on hemiplegic shoulder. Articles were electronically searched from the year 2000 to 2017 in the 4 databases, Google scholar, CINAHL, Pubmed, and Pedro. Reviewers graded the papers according to Lloyd-Smith's hierarchy of evidence scale. Papers were quality appraised using a systematic review of RCT tool developed by National Heart, Lung and Blood Institute (United States), named as quality assessment of controlled intervention studies tool. *Results:* Eight papers were included, totaling 132 participants. All the RCT's included in this review were good quality. There was a significant effect on taping method for reduction of pain and subluxation among subjects with stroke. *Conclusions:* This systematic review provides sufficient evidence to suggest taping is a beneficial method for reducing pain and shoulder subluxation among stroke subjects.

Key Words: Hemiplegia—Stroke—Subluxation—Taping—Kinesio-taping

Introduction

Stroke is a clinical syndrome characterized by the sudden onset of a persistent focal neurological deficit secondary to a vascular lesion.[1] Paralysis of unilateral upper and lower limb is the main feature of stroke. Stroke is one of the main causes of mortality in adult populations of developed countries. In majority of the countries stroke is the second or third cause of mortality. A substantial portion of those surviving from stroke will typically experience neurological sequelae and stroke-related complications.[9] Upper limb paralyses in stroke leads to complications such as glenohumeral/shoulder subluxation and pain. Shoulder pain is a common complication in patients with stroke and adversely affects patient's quality of life. Pathophysiological factors that contribute to the shoulder pain comes from either rotator cuff injury or subluxation of humeral head.[21] Glenohumeral subluxation is defined as abnormal increased translation of humeral head relative to the glenoid fossa. Weak muscles around the shoulder joint interrupt with mechanical integrity and stability of the joint resulting in a palpable gap between the acromion and the humeral head. During the initial period of stroke, the hemiplegic arm is flaccid or hypotonic and hence the shoulder muscles are unable to anchor the humeral head within the glenoid cavity.[21] Deltoid, supraspinatus, and infraspinatus are the most important muscles in

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preventing subluxation of shoulder joint. Deltoid combines with rotator cuff muscles and acts as a force couple (2 equal force acting in opposite direction to rotate a part around its axis of motion). Weakness or paralysis of these muscles results in a downward sloping of glenoid fossa, and the capsule is no longer taut, and the head of humerus slides down the glenoid fossa. The reported incidence of Glenohumeral subluxation is a major challenge in the rehabilitation of patients with stroke. A stroke patient with a flaccid shoulder also has a high likelihood of experiencing shoulder pain or subluxation during rehabilitation and daily life. Hemiplegic shoulder subluxation has negative effects on poststroke functional recovery, activities of daily living, quality of life, and length of hospital stay.[2] A significant proportion of patients with stroke suffer from hemiplegic shoulder pain and subluxation with a prevalence of 17% at 1 week[3] rising to 22%-40% at 4-6 months.[4] A systematic review proved an association between shoulder subluxation and hemiplegic shoulder pain reported in studies with larger sample sizes (>70 subjects).[5] Early detection and prevention of subluxation through correct positioning and alignment will reduce the likelihood of pain. Extreme care must be taken when completing passive range of motion with the hemiplegic shoulder; motion should not exceed beyond 90° of shoulder flexion and abduction without scapular upward rotation and humeral head external rotation.[6] During the initial flaccid or hypotonic stages of stroke, the affected extremity should be properly supported. Arm slings or orthotic devices were commonly prescribed to protect the hemiplegic shoulder from subluxation. Exercises have a very limited result in managing pain and subluxation among these subjects. Taping is an advanced method commonly utilized in sports and other musculoskeletal conditions. Taping for a subluxation has conflicting evidence for reducing the development of hemiplegic shoulder pain and subluxation. Taping is used as a method for preventing or reducing shoulder subluxation and may provide a certain level of sensory stimulation. Taping promotes normal alignment of scapula in relation to th thorax, humerus, and clavicle. Proprioceptive feedback serves as a reminder to the patient to handle the upper extremity properly. Taping also prevent over stretch of weak rotator cuff muscles and other soft tissues (Fig. 1). There is limited evidence in the literature to apply taping among hemiplegic subjects. This paper intends to provide an extensive overview of taping effects on glenohumeral joint. The objective of this review is to analyze the effectiveness of taping intervention measured through various outcome tools used in the randomized controlled trials among hemiplegic/hemiparetic subjects.

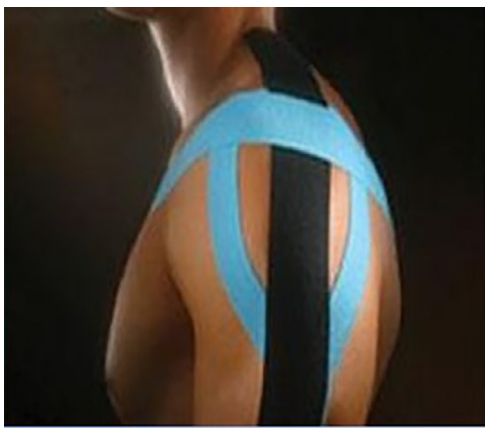

Figure 1. *Kinesio-taping model for shoulder.*

Methods

Eligibility Criteria

Articles for this systematic review were searched on the following basis of inclusion criteria. They were subjects with stroke, stroke onset is minimum 3 weeks, subjects above 55 years of age, both female and male genders, randomized controlled trials, studies intervening taping methods among stroke subjects, studies published in English, full text availability.

Exclusion Criteria

The exclusion criteria set in this systematic review were studies not having full access and RCTs published in languages other than English.

Search

This systematic review was performed from September 2017 to November 2017. We made a comprehensive search to locate papers in the following database CINAHL, Pubmed, Pedro, and Google scholar. The search was made using the following key words; stroke, hemiplegia, shoulder, taping, strapping, K tape, pain, and subluxation. Time restraints were set from 2000 to 2017 for the articles.

Study Selection

Three reviewers performed the study selection process. Randomized and pretest posttest studies were included. Studies intervening hemiplegic shoulder with taping are included in this review. Controlled or placebo or sham studies comparing any taping methods like K tape, Elastic tape, and inelastic tape were selected for the review.

Hierarchy of Evidence

Two reviewers independently assessed all papers sourced. First the level of each paper was determined according to the hierarchical system of Lloyd-Smith (Table 1). The level reflects the degree to which bias has been considered within study design, with a lower rating on the hierarchy indicating less bias. Only papers that

Table 1. *Lloyd-Smith hierarchy of evidence*

Level of evidence	Study design	RCTs
1a	Meta-analysis of randomized controlled trials	
1b	Individual randomized controlled study	1. Hanger et al,[13] 2. Griffin and Bernhardt,[14] 3. Kim and Kim ,[15] 4. Heo et al,[16] 5. Huang et al,[17] 6. Chatterjee et al,[18] 7. Santos et al,[19] 8. Huang et al[20]
2a	Well-designed, nonrandomized controlled study	
2b	Well-designed quasi-experimental study	
3	Nonexperimental descriptive studies-comparative/case studies	
4	Respectable opinion	

scored between 1b and 2a on Lloyd-Smith scale were included in this review. In this way we could ensure that taping for hemiplegic shoulder advocated by this review were based on findings of high-level evidences.

Date Extraction

Two reviewers undertook the data extraction and identification of risk of bias, using structured formats. Key data extraction included the following items: general study information (title, author, and country of study); study design and characteristics (participant characteristics, potential predictors, and outcomes); and findings including length of follow-up. Any differences in data extraction were resolved by mutual agreement, and where necessary, referred to a third reviewer.

Quality Appraisal

Three reviewers assessed the quality of these papers based on a tool developed by National Heart, Lung and Blood Institute (United States), named as quality assessment of controlled intervention studies (Table 2). The quality of each paper was scored according to the factors shown in quality assessment of controlled intervention studies tool. One point was allocated for the fulfillment of each quality appraisal item. The lowest score was 0, and the maximum possible score was 14. The methodological quality of each study was graded as low (0-4), moderate (5-10), or high (11-14). All reviewers were ensured that they are consistent in their approach. Disagreements among the reviewers were solved by consensus building. Finally 2 reviewers independently extracted data from each included study using a standardized performa. All reviewers were ensured that they are consistent in their approach. Disagreements among the reviewers were solved by consensus building. In this review 2 RCTs were graded as high quality with the score of 11 out of 14, 5 RCTS were graded between 7 and 10 out of 14. Due to less number of RCTs on taping intervention among stroke subjects there is lack of high quality RCTs in the literature.

Risk of Bias

Risk of bias is more common in articles selected for review. In this systematic review risk of bias in individual article is carefully scrutinized by the reviewers. Selection bias, performance bias, detection bias, attrition bias, and reporting bias among the study were critically considered and analyzed by the reviewers. Those details were mentioned in the result section.

Study Outcomes

The following outcomes were of interest: Shoulder subluxation, pain assessment, fugl meyer assessment – upper extremity, Modified ashworth scale, motor assessment scale and range of movement of the shoulder.

Summary Measures

The principle summary measures were taping as a therapeutic intervention with pain and subluxation as the predictors of outcomes. Data were narratively synthesized via characteristics of randomized controlled trials.

Results

Study Selection

A total of 100 references were initially identified. Out of which 8 RCTs were included in this review. The outcome of application of search strategy is outlined through PRISMA flow diagram (Fig. 1). Sixteen articles were retrieved, but a further 8 were excluded due to nonavailability of access to full text and during data extraction process.

Study Characteristics

Participants

The characteristics of study population are summarized in Table 3. Overall a total of 132 patients participated in this study. None of the reviews specifically targeted

Table 2. *Quality assessment of controlled intervention studies*

Criteria	Hanger et al[13]	Griffin and Bernhardt[14]	Kim and Kim[15]	Heo et al[16]	Huang et al[17]	Chatterjee et al[18]	Santos et al[19]	Huang et al[20]
1. Was the study described as randomized, a randomized trial, a randomized clinical trial, or an RCT?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Was the method of randomization adequate (i.e., use of randomly generated assignment)?	Yes	Yes	Not reported	Not reported	Yes	No	Yes	Yes
3. Was the treatment allocation concealed (so that assignments could not be predicted)?	Yes	Yes	Not reported	Not reported	No	Not reported	Yes	Yes
4. Were study participants and providers blinded to treatment group assignment?	No (Single blinded)	No (Single blinded)	Not reported	Not reported	Yes	No	Not reported	Yes
5. Were the people assessing the outcomes blinded to the participants' group assignments?	Yes	Yes	Not reported	Not reported	Yes	Not reported	No	Yes
6. Were the groups similar at baseline on important characteristics that could affect outcomes (e.g., demographics, risk factors, comorbid conditions)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7. Was the overall drop-out rate from the study at endpoint 20% or lower of the number allocated to treatment?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Was the differential drop-out rate (between treatment groups) at endpoint 15 percentage points or lower?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9. Was there high adherence to the intervention protocols for each treatment group?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2 (*Continued*)

Criteria	Hanger et al[13]	Griffin and Bernhardt[14]	Kim and Kim[15]	Heo et al[16]	Huang et al[17]	Chatterjee et al[18]	Santos et al[19]	Huang et al[20]
10. Were other interventions avoided or similar in the groups (e.g., similar background treatments)?	No	No	No	No	No	No	Yes	No
11. Were outcomes assessed using valid and reliable measures, implemented consistently across all study participants?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12. Did the authors report that the sample size was sufficiently large to be able to detect a difference in the main outcome between groups with at least 80% power?	Yes	No	No	No	No	No	No	No
13. Were outcomes reported or subgroups analyzed prespecified (i.e., identified before analyses were conducted)?	No	No	No	No	No	No	No	No
14. Were all randomized participants analyzed in the group to which they were originally assigned, i.e., did they use an intention-to-treat analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scores	11/14	10/14	7/14	7/14	10/14	7/14	10/14	11/14

Table 3. *Characteristics of study population and studies*

Author	Setting	Blinding	Intervention	Duration of intervention	Outcome measures	Result	Conclusion
Hanger HC et al (2000)	New Zealand	Single blind	Therapeutic strapping (N=36)	14 weeks	• Visual analogue scale • Shoulder range of movement to the point of pain • Functional independence measure • Motor assessment scale • Rankin disability index	There is no significant changes in both the groups	Authors unable to demonstrate the benefits of strapping
A Griffin and J Bernhardt (2006)	Australia	Single blind	Therapeutic strapping (N = 10)	4 weeks	• Number of pain free days measured using Ritchie Articular index • Modified ashworth scale • Range of shoulder movement • Motor assessment scale	There was a significant difference between therapeutic strapping and control groups in Ritchie articular index. Motor assessment scale, range of motion and modified ashworth scale scores remained low for all the groups.	Therapeutic strapping limited development of hemiplegic shoulder pain during rehabilitation in at risk stroke patients.
Kim EB and Kim YD (2015)	South Korea	Not mentioned	K tape (N = 15)	28 weeks	• Manual function test, • Modified motor assessment scale • Brunnstrom recovery stage • Functional independence measure (FIM)	Manual function test and modified motor assessment scale results differed significantly after the intervention in both the groups. There was no change in Brunnstrom recovery stage in both the groups after intervention. However post intervention functional independence measure changed significantly within each group and differed significantly between groups.	Taping improves restricted coordinate movement of upper limb. Taping does not affect the control of muscle tone or coordination in distal part of upper extremities especially in hand.

Table 3 (*Continued*)

Author	Setting	Blinding	Intervention	Duration of intervention	Outcome measures	Result	Conclusion
Heo MY & coauthors (2015)	Korea	Not mentioned	Inelastic tape (N = 18)	8 weeks	• Pain (VAS) • Shoulder subluxation	Experimental group was significantly different from control group in terms of pain management and grade of subluxation	Inelastic shoulder taping is effective at reducing shoulder subluxation and pain of acute stroke patients
Huang YC et al (2016)	Taiwan	Double blinded	K taping (N = 21)	3 weeks	• Modified Barthel Index • Stroke-Specific Quality of Life • Pain-free passive ROM of the hemiplegic shoulder • modified Ashworth scale • shoulder subluxation • Fugl Meyer assessment of upper extremity interventions. • Stroke specific quality of life • Shoulder sonography was used to evaluate the long head of the biceps tendon, subscapularis, supraspinatus and infraspinatus tendons, acromioclavicular joint, and subacromial-subdeltoid bursa.	There were no significant differences in the shoulder subluxation and spasticity measured before and after treatment in the two groups. Significant increase in shoulder flexion was found after treatment in the K tape group ($P = .01$). The Fugl meyer for upper extremity, modified Barthel index, and Stroke specific quality of life scales were significantly improved after treatment in both groups ($P < .01$	Conventional inpatient rehabilitation wit 3 weeks of therapeutic k tape resulted in improvement of upper extremity function, daily activity and quality of life without further shoulder soft tissue injury.
Chatterjee et al (2016)	India	Double blinded	California tri pull taping method (N = 15)	6 weeks	• Pain (VAS) • Shoulder subluxation • Upper extremity motor ability • Active shoulder flexion	The intervention group (M = 1.857, standard deviation = .738) had significantly shorter subluxation than the control group (M = 2.740, SD = .893).	California tripull taping method reduces pain, subluxation and improves movement in the shoulder joint.

(*Continued*)

Table 3 (*Continued*)

Author	Setting	Blinding	Intervention	Duration of intervention	Outcome measures	Result	Conclusion
						Intervention group showed significantly good result in reducing pain and improving active shoulder flexion.	
Santos GLD & Coauthors (2017)	Brazil	Double blinded	Kinesio taping (N = 6)	10 minute	• Joint position sense • Grades of subluxation • Fugel Meyer assessment	No differences were observed between the intervention and control groups.	Elastic tape applied to the paretic shoulder improved joint position sense during abduction and flexion in chronic hemiparetic subjects.
Huang YC et al (2017)	Taiwan	Double blinded	Kinesio taping (N = 11)	3 week	• Pain (11 point Numerical rating scale) • Shoulder pain and disability index • Ultrasound examination of muscle tendon pathology, • Subacromial distance, • Pain free passive range of motion of the shoulder	Significant differences were observed in favor of K tape group regarding improvement in numerical pain ($P = .008$) and shoulder pain and disability index ($P < .001$) scores. There was significant improvement in degrees of pain-free range of motion in flexion ($P = .008$), external rotation ($P = .006$) and internal rotation ($P = .004$) in the K tape group.	K tape is effective in reducing scores in shoulder pain and disability index, pain and improves pain free range of motion in shoulder.

taping as intervention for hemiplegic shoulder. All the randomized controlled studies included in this review targeted hemiplegic subjects with no history of shoulder pain either before or after the onset of stroke.

Risk of bias within studies

The reviewers analyzed the bias and is reported as follows (Table 4), bias with respect to selection process among the 8 randomized controlled trials totally 5 articles reported about the procedure of proper randomization sequence. The randomized controlled trials by Kim and Kim,[15] Heo et al[16] and Chatterjee et al[18] have not mentioned about the randomization method used. Four randomized controlled trials allocated the subjects through concealed method. The remaining articles have not reported clearly concealed allocation processes.

In study performance bias only 2 of the randomized controlled trial was found to be double blinded and the remaining articles are all single blinded. Five randomized controlled trials by Hanger et al,[13] Griffin and Bernhardt,[14] Huang et al,[2] Santos et al,[19] and Huang et al[20] had blinded outcome assessor.

Regarding the completeness of outcome data all the 8 randomized controlled trials met the eligibility.

Table 4. *Risk of bias analysis*

Selection bias	**Random sequence**	Hanger et al[13] Griffin and Bernhardt[14] Huang et al[17] Santos et al[19] Huang et al[20]
	Allocation concealment	Hanger et al[13] Griffin and Bernhardt[14] Santos et al[19] Huang et al
Performance bias	**Blinding of participants and treating therapist**	Huang et al[17] Huang et al[20]
Detection bias	**Blinding of assessor**	Hanger et al[13] Griffin and Bernhardt[14] Huang et al[17] Santos et al[19] Huang et al[20]
Attrition bias	**Completeness of outcome data**	Hanger et al[13] Griffin and Bernhardt[14] Kim and Kim[15] Heo et al[16] Huang et al[17] Chatterjee et al[18] Santos et al[19] Huang et al[20]

Result of individual studies

Hanger et al[13] performed a randomized controlled trial in New Zealand with 98 subjects out of which 49 were included in the intervention group. The intervention group received shoulder strapping for 6 weeks. The outcome measures used were visual analogue scale, shoulder range of movement to the point of pain, functional independence measure, motor assessment scale, and rankin disability index. Their study result demonstrated that strapped group had a trend to less pain at visual analog scale (P = .09) and better arm function (P = .12). But the study had no evidence that strapping reduced the prevalence of subluxation.

Griffin and Bernhardt[14] in their randomized controlled trial in Australia compared strapping with placebo techniques and found that strapping limited development of hemiplegic shoulder pain during rehabilitation in at risk stroke patients. The outcome tools used were number of pain free days, motor assessment scale, and Modified ashworth scale. Their result showed that subjects in the therapeutic strapping group had a significant mean of 26.2 (±3.9) pain free days when compared to the placebo/control groups. However the motor assessment scale score remained low for all groups. There were no significant changes in muscle tone.

Kim and Kim[15] randomized 30 hemiplegic subjects into experimental (n = 15) and control (n = 15) group. Baseline and 28 weeks post intervention outcomes were assessed using manual functional test, manual motor assessment scale, Brunnstrom recovery stage, and functional impairment movement. The manual functional test and manual motor assessment scale results differed significantly after intervention in both groups (Experimental group: 22.47 ± 6.55 and 13.87 ± 5.06; Control group: 21.33 ± 6.23 and, 13.80 ± 5.25, respectively). There was no statistical result obtained in this RCT favoring experimental group in terms of improving coordination in joints distal to shoulder.

Heo et al[16] investigated the impact of inelastic taping on the shoulder joint subluxation in acute stroke. Their intervention was conducted for 8 weeks with 18 stroke patients in the experimental group and control group. After 8 weeks, the degree of subluxation in the inelastic taping group was found to be significantly different from that of the control group. The mean ± standard deviation of the experimental group at 4 and 8 weeks were 25.0 ± 4.3 and 21.0 ± 4.8, when compared to the control group's mean and standard deviation of 28.0 ± 4.8 and 25.7 ± 5.0, respectively. Statistical results favor the inelastic taping intervention in terms of reducing pain and subluxation among hemiplegic stroke patients.

Huang et al[2] assessed the impact of kinesiology taping on hemiplegic shoulder pain, upper extremity functional outcomes and the prevention of shoulder soft tissue injury in subacute stroke patients with hemiplegic shoulders

during rehabilitation. In this RCT 21 patients underwent kinesiology taping intervention and 23 patients were included as controls. Statistically, significant increase in shoulder flexion was found after 3 weeks of intervention in the experimental group ($P = .01$), but no differences were noted in other planes of motion. The incidence of hemiplegic shoulder pain remained unchanged in the kinesiology taping group. There were no significant differences in the shoulder subluxation and spasticity measured before and after treatment in the 2 groups

Chatterjee et al[18] in 2016 performed a RCT among 30 stroke participants randomly assigned to California tri pull taping group and control group. The intervention was provided for 6 weeks duration. At posttest, the treatment group (Mean = 1.857, standard deviation = .738) had significantly shorter acromio humeral distance (subluxation) than the control group (Mean = 2.740, standard deviation = .893). There is statistical significance in pain reduction and improving shoulder flexion range of motion among the treatment group participants when compared to the control participants.

Santos et al[19] studied the effects of elastic tape on the paretic shoulder. These researchers measured joint position sense, Fugl-Meyer and shoulder subluxation as outcome measure. The intervention (elastic taping) group, had a difference in pre and post intervention for shoulder abduction at 30 degree ($P < .010$) and 60 degree ($P < .010$) and flexion at 30 degree ($P < .010$) and 60 degree ($P < .010$) were observed. They concluded that elastic taping improved joint position sense of subjects with hemiparesis regardless of level of upperlimb sensorimotor impairment.

Huang et al[20] performed a double blinded clinical trial in 2017 among 21 hemiplegic subjects. Those subjects were randomized into kinesiology taping group (n = 11) and sham group (n = 10). Three weeks of posttest intervention outcomes were measured using numerical rating scale, shoulder pain and disability index, pain free passive range of motion of the shoulder. Statistical analysis revealed kinesiology taping group showed more improvement in the numerical rating scale ($P = .008$), shoulder flexion ($P = .008$), external rotation ($P = .008$), internal rotation ($P = .040$) and shoulder pain and disability index ($P < .001$) than the sham group.

Synthesis of results

Eight RCTs analyzed in this review demonstrated various statistical outcomes. Among the 8 RCTs by various researchers, 7 RCTs statistically prove that taping is effective in stroke subjects. One RCT by Hanger et al[13] in 2000 demonstrated better post interventional outcomes in terms of reducing pain and improving upper limb function among stroke subjects, but these results did not reach statistical significance. Hence they concluded that strapping had no significant benefit among hemiplegic subjects. Remaining 6 RCTs in our review concludes that taping has significant statistical effect among subjects with stroke.

Discussion

The purpose of this systematic review was to examine the effect of taping in hemiplegic or hemiparetic shoulder. There were no studies that evaluated the effectiveness of therapeutic taping in hemiplegic shoulder in a systematic way. To our knowledge this is the preliminary systematic review to analyze the effects of taping among hemiplegic subjects.

Pain in the hemiplegic shoulder is common, persistent, and distressing to patients. It is important to acknowledge that current understanding of hemiplegic shoulder pain is limited. Pain is common complication in patients with stroke and may adversely affect patient's quality of life.[10] Glenohumeral subluxations occur during flaccid stage of stroke in the inferior direction. This is due to the effects of gravity and the failure of passive restraints that stabilize the glenohumeral joint. Shoulder subluxation can lead to soft tissue damage as traction damage can occur due to gravitational pull forces and poor protection is offered by a weak shoulder. The relationship between hemiplegic shoulder subluxation and pain is still debated.[11]

Taping is commonly used in the field of rehabilitation as both a means of treatment and prevention of musculoskeletal disorders.[8] The function of taping is to provide support during movement.[7] Jaraczewska and Long in 2015 stated that kinesio taping method in conjunction with other therapeutic intervention may facilitate or inhibit muscle function, support joint structure, reduce pain, and provide proprioception for the upper extremity in hemiplegia.[12] This is due to the fact that taping stabilizes shoulder and restores scapular alignment after stroke, which is critical in any rehabilitation program of upper limb following stroke. In this review among 8 RCTs analyzed, an RCT by Hanger et al[13] states that taping does not have any significant result in the hemiplegic shoulder. And the same author has suggested taping shall be used as adjunct therapy in hemiplegic shoulder management. The remaining 7 RCTs concluded that taping is effective in reducing pain and subluxation among hemiplegic subjects.

Hence this review suggests that taping shall be used as a therapeutic intervention in hemiplegic shoulder management. More than therapeutic management, it will be a promising intervention to investigate its effect on prevention of hemiplegic shoulder pain and subluxation.

Limitations

The main limitation of this review is that the outcome measures were not similar across the RCTs included in this review. Majority of the studies used shoulder subluxation as the outcome tool. Certain studies analyzed using

shoulder range of motion. The common outcome measure used in all the RCTs is pain scale (visual analogue scale or numeric pain rating scale). Second limitation in this review is that, the majority of the RCTs included hemiplegic subjects, whereas few RCTs included hemiparetic subjects. Third limitation was all the types of taping method were included as an intervention in this review. All these limitations were due to limited availability of RCTs on taping among stroke subjects.

Conclusions

The findings of this review suggest that taping could be a treatment option among subjects with stroke. This review supports the evidence that taping reduces post stroke pain, subluxation, improves motor control, coordination, and movement of hemiplegic upper limb.

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