BIN BIN

THE EFFECTIVENESS OF ACUPUNCTURE IN UPPER EXTREMITY MOTOR FUNCTION REHABILITATION IN POST-STROKE PATIENT-SYSTEMATIC LITERATURE REVIEW

Degree Programme in Physiotherapy
2019

samk
Satakunnan ammattikorkeakoulu
Satakunta University of Applied Sciences

The effectiveness of acupuncture in upper extremity motor function rehabilitation in post-stroke patient—Systemic literature review

Bin, Bin
Satakunnan ammattikorkeakoulu, Satakunta University of Applied Sciences
Degree Programme in Physiotherapy
November 2019
Number of pages: 33
Appendices: 1

Keywords: acupuncture, post stroke, upper extremity, motor function, rehabilitation

---

The aim of this thesis is to find out the effects of acupuncture in upper extremity motor function rehabilitation in stroke patient. A form of systematic literature review is used to complete the thesis research. The component of the theoretical part includes background of stroke, such as pathology and complications. Upper extremity motor Function rehabilitation in stroke patient will be presented, as well as the basics of acupuncture, which extended to the definition, acupuncture mechanism, and evidence-based acupuncture. The effects of acupuncture in upper extremity motor function rehabilitation for stroke patient will be discussed.

The research was done through three main databases, which are PubMed, ScienceDirect, and Cochrane. Three studies remained after applying inclusive and exclusive criteria. However, after using PEDro to assess the quality of the articles, only one of the studies was assessed, the other two studies were not assessed by given reasons of ineligible index due to the properties of the study was “systematic review” and “study protocol”. Thus, the quality of the searching result is uncertain.

CONTENTS

1 INTRODUCTION

The meaning of stroke in Greek is “struck suddenly with violence”, in another word, “being suddenly stricken” (Caplan 2006, 2). Due to the development of demography along with the increasing elderly population, stroke is a growing global issue in health care industry (Hennerici, Binder, Kern & Szabo 2012, 3).

Acupuncture is one of the stroke care tools which being recommended by World Health Organization (WHO) as an alternative and complementary strategy for stroke treatment (Chave, et al. 2017, 2270). In China, doctors have been using acupuncture as part of traditional Chinese medicine to improve motor and functional results in stroke patients for centuries (Barnes, Dobkin & Bogousslavsky 2005, 172). The outcomes of acupuncture as an additional treatment in improving motor, sensation, speech, and other neurological functions has been well satisfied by patients from China after stroke (Sun, Wang & Wen 2012, 1193).

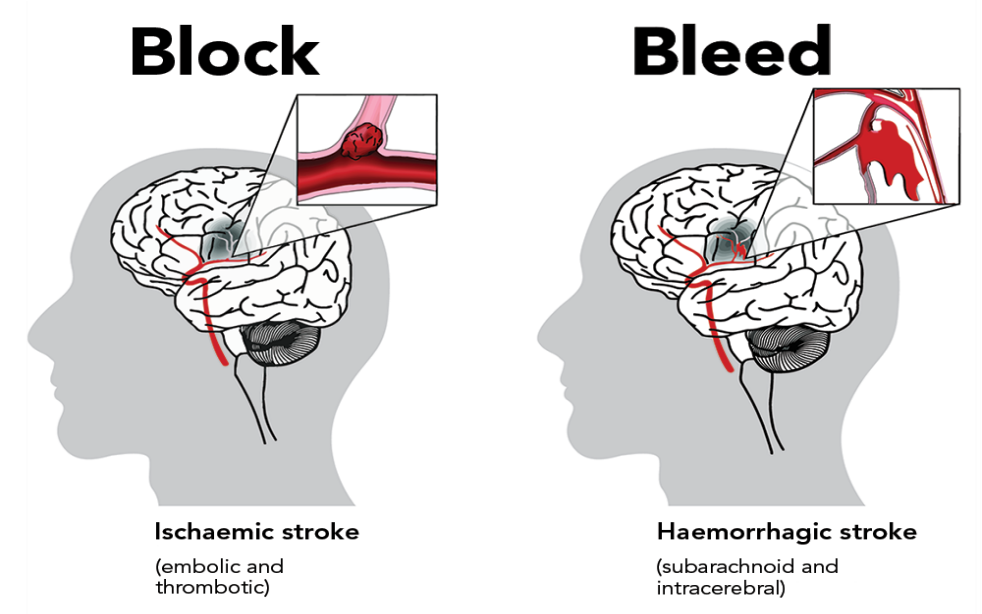
A question of whether acupuncture has benefits for stroke patient has been asked since acupuncture has been used in the treatment of stroke patient 50 years ago, and the studies being completed so far do not prove that acupuncture helps stroke patients to recover. However, studies done in China, Japan and Korea showed evidence that acupuncture improves the rehabilitation outcome in stroke patient. (Xia, Cao, Wu & Cheng 2010, 232.)

2 STROKE

2.1 Stroke pathology

The term of stroke refers to different kind of diseases concerning blood vessels that supply the brain with needed nourishment and fuel. The brain, an organ of our body, it requires more fuel than any other organ of our body. Sugar and oxygen are the two main energy sources that brain needs. Sugar and oxygen are carried in the serum of the blood and in the haemoglobin of red blood cells respectively. Stroke happens when a part of our brain doesn't receive adequate blood, or there are insufficient sugar or oxygen in the blood, in turn, the function of that part of brain will be affected. (Caplan 2006, 9-10.)

There are two type of stroke, which are haemorrhage and ischemia, picture 1 presents these two types of stroke. Haemorrhage is bleeding inside the skull. In contrary, ischemia is characterised insufficient blood supply to the brain tissue to maintain normal function of the affected area. However, brain ischemia is more common than haemorrhage, about four strokes out of every five are ischemia. (Caplan 2006, 10-11.)



Picture 1: Types of stroke (Website of Stroke Foundation 2019)

2.2 Complications of stroke

Syndromes in stroke differs from the Ischemic and haemorrhage, as well as the location of damaged tissue, therefore, clinical deficits have its own pattern depends on the cause and location of the lesion (Torbey & Selim 2013, 34).

Ischemic stroke caused by large-artery atherosclerosis, which extend to two infarct mechanism, perfusion failure and artery-to artery embolism, has clinical deficits of arm weakness, hypertension, diabetes, limb unilateral involuntary trembling, shaking, twisting or jerking movements (Mendelow, Sacco & Wong. 2013, 299-300). Embolism causes 70% in ischemic stroke, embolic ischemic stroke leads to seizure, aphasia, neglect, dyspraxia, agraphesthesia, hemianopia, and isolated hand weakness. Small artery occlusion, such as, penetrating artery, resulting in isolated

unilateral weakness, ataxia, numbness, paraesthesia and clumsy hand-dysarthria (Mendelow, Sacco & Wong 2013, 301-302).

Symptoms of intracerebral haemorrhage are similar as ischemic stroke, both types have acute onset symptoms and focal deficits. But, on top of focal deficits, the bleeding in the cerebral causes nausea, vomiting, headache, and increased level of unconsciousness. What's more, complications in haemorrhage stroke worsen progressively during the acute stage (Torbey & Selim 2013, 35).

Other medical complications are common in stroke patient, it can affect the length of hospitalization, recovery or rehabilitation outcome, cost of care, and more severely, causing death. Venous thromboembolism (VTE), comprising pulmonary embolism (PE) and deep venous thrombosis (DVT) are potential fatal but not inevitable complications, it's said that early mobilization works effectively to reduce the possibility of DVT. (Barrett & Meschia 2013. 103). Urinary tract infection (UTI) are often presented due to the decline of neurological status during hospitalization and extended hospitalization, it is also associated with the use of catheter (Barrett & Meschia 2013. 105). Incontinence and retention are signs of bladder dysfunction, which are commonly observed in post stroke patient (Barrett & Meschia 2013, 106). Due to the immobility and hospitalization, pressure sores and ulcer, ventilator-associated pneumonia (VAP) are frequently founded in post stroke patient. There is high risk of fall for post stroke patient, a study concluded 8.9% of falling per 1000 patient per day with 23 hospital admitted. The risk factors including cognitive, motor sensory, balance impairment, hemineglect, polypharmacy, and urine incontinence. (Barrett & Meschia 2013, 106-107.)

During the acute stage, delirium is often not being recognised, even though it has 14%-48% prevalence, it characterised by change level of consciousness, inattention, disorganized thinking, disorders in orientation, memory, perception and behaviour, hallucination, paratonia, and asterixis (Barrett & Meschia 2013, 109-110).

Neurological complications are not as common as medical complications, and it occurs particularly earlier after acute stroke stage. The most frequent neurological complications including cerebral edema, haemorrhagic transformation, miscellaneous neurological complications, sleeping disorder, and sleeping-disordered breathing (Barrett & Meschia 2013, 110).

3 UPPER EXTREMITY MOTOR FUNCTION

3.1 Upper extremity motor function affected after stroke

According to the International Classification of Functioning, Disability and health (ICF) model, impairment can de defied from two aspects. Firstly, injury of body function, which can be explained as deviation or loss in musculoskeletal and movement-related function, for instance, abnormal joint mobility, muscle strength, muscle tone, and/or involuntary movement. Secondly, injury of body structures, for example, damage of nerve system or movement related structure will limit the function of affected structure such as hand and/or arm. These two types of injury could happen in stroke patients, which lead to movement limitations of upper extremity, thus, affecting upper extremity function. (Raghavan 2015, 599-610).

The loss of motor function lead to the limitation of mobility, daily life independency, social and work participation, which contribute to a low life quality (Hatem, et al. 2016, 442). The injured zone in the brain sometimes shows reduced activity, especially the injury in the elegant/eloquent cortex or efferent. For instance, study showed that motor maps are smaller and corticospinal tract integrity is decreased in parallel with the severity of clinical deficits. (Stein, Harvey, Marko, Winstein & Zorowitz 2009, 140.) Motor function recovery has the feature of individual's ability of using the same effectors and muscle activation patterns in the same manner as prior to stroke to perform movements (Stinear, Byblow & Ward 2014, 489-498).

3.2 Assessment used in upper extremity motor recovery

A study done by Xu et al. in 2017 focused on hand motor recovery of finger strength and control, because they found strength and control are the two factors that influence the outcome of hand motor recovery. In the study, power grip was used to measure the finger strength. Another hand-shaped keyboard ergonomic device was used to measure individual function of the finger (Xu et al. 2017, 1151-1163).

Another study used Wolf Hand Function Test and Action Research Arm Test as their parameter to study motor recovery of the affected hand in subacute Stroke Correlates with Changes of Contralesional Cortical Hand Motor Representation (Veldema, Bösl & Nowak 2017, 2). Upper Extremity Fugl-Meyer Assessment was used to conduct the classic longitudinal study of recovery at the level of impairment by Duncan (Krakauer & Carmichael 2017,

4 ACUPUNCTURE

4.1 Definition & Mechanism

Acupuncture eventually means to puncture with a needle. However, the use of acupuncture commonly combines with moxibustion. Moxibustion can be explained by burning selected herb on or over skin, it may concern other type of stimulation to certain point. (World Health Organization 3, 2002). Acupuncture is a part of health care system in China where has been used for thousands of years, it is done by insert a fine, solid needle to anatomical points of the body to stimulate biological and physiological changes to improve or overcome illnesses and conditions, it balances the energy in our body. Some of the chemicals released by the acupuncture stimulation can decrease or eliminate pain sensation. Nowadays, techniques such as, pressure, magnets, electrical and others are being used. (Website of WebMD 2019.)

Acupuncture stimulates not only one part of the nerve system, for example, it occurs at peripheral tissue, spine and central nerve system. (1). At peripheral level, the stimulation of the needle activates A-alpha, -beta, -delta and C-fibres when applying the needle on skin and muscle. To be more specific, the activation of A-delta and C-fibres are needed for moderating pain and autonomic nervous system activity. (2). At the spinal level, inhibition occurs in nociceptor and sympathetic system, which terminate in the spinal cord at the same segments. (3). Central mechanism, central nerve system (CNS) being affected by acupuncture in multiply ways. CNS receives signals from peripheral nerve system when a needle is inserted. On one hand, CNS regulates homeostasis, pituitary hormone release might be affected. On the other hand, acupuncture adjusts immune,

endocrine and metabolic function through CNS. In addition, hypothalamus is affected more than other area in the brain, even though, acupuncture affect many areas of the brain. (Hong 2013, 7-8.)

Acupuncture in pain mechanism described as the sharp needle stimulation represent artificial activation, which trigger the natural biological system effects. The activation of receptors and/or nerve fibres in the targeted tissue leads physiological changes equivalent to muscle contraction. It's suggested that one mechanism won't be able to explain how acupuncture affects pain, because the pain itself contains varies neuroplastic changes that are part adaptive or maladaptive reactions. (Hong 2013, xvi.)

4.2 Evidence-based Acupuncture

Evidence-based clinical practice referred as evidence-based medicine, meaning that the best evidence should be used conscientiously, explicitly and judiciously in forming the care of each unique patient (Al-Ghimlas 2013, 131-132). A treatment option would not worth of respect if evidence-based clinical practice screening was not applied, therefore, a traditional treatment could not be considered an evidence-based clinical practice rather than an interesting traditional folklore. Even though acupuncture has been practiced for more than two thousand years, yet it has not been considered evidence-based practice. (Leung & Liu 2013, xvi-xvii.)

More and more clinical reports concerned about effects of acupuncture have been recorded or published based on the experience and observation in the past twenty years. Small animals are often used in the laboratory, in purpose of understanding the physiology phenomenon. Evidence from

MRI while applying acupuncture demonstrated that acupuncture initiates various neurotransmissions by acting via complicated neural pathway. Han from China successfully developed techniques by using complicated computer to observe neurophysiology during utilization of acupuncture. However, reactions between neuros are affected by other humoral and immunological activates as well, therefore, the effect of acupuncture cannot be explained without taking into account of multiple biological and molecular level, these two aspects need to be included in the future experiment. (Leung & Liu 2013, xvii.)

5 AIM AND OBJECTIVES

The aim of this thesis is to find out the effectiveness of acupuncture on upper extremity motor function rehabilitation in post stroke patients.

The objective of this thesis is to carry out a literature review to determine the impact of acupuncture on upper extremity motor function rehabilitation of post stroke patient. In this systematic literature review the research question is:

1. Does acupuncture improve upper extremity motor function rehabilitation for post stroke patient?

6 THESIS PROCESS

The selection of writing acupuncture and stroke was decided in September 2018. The complications after stroke is a wide topic, and the treatment

applied by acupuncture has varies effect on different symptoms, therefore, it had been narrowed down to motor function rehabilitation. Considering the motor function could be affected through the whole body, it finally focused on upper extremity motor function rehabilitation. Research and writing started in the spring of 2019 followed the presentation at thesis seminar. The literature review was done in the autumn of 2019. Ultimately, the thesis was completed in the winter of 2019.

7 SYSTEMATIC LITERATURE REVIEW

7.1 Overview of systematic literature review

Systematic review is defined as a review of existing research using explicit, accountable and rigorous research methods. The research needed to be done in an adequate systematic strict and explicit way so that the result can explain and assist the question of how the result were produced (Gough, Oliver & Thomas 2012, 15). Systematic review is a common method used in medical and health field to provide evidence-based resources for heal-care workers in making unique care decisions and for better outcome, it plays a key role in evidence-based practice (Website of Library guides 2019). It concerns planning a thoughtful search strategy which include a particular theme or answers a defined question. The review presents type of searched, selected and reported information within a period of time. Before doing the research or writing the review, it´s important to define the criteria clearly, and focus on the plan or protocol. As usual, various databases are used during comprehensive, transparent search, the literature can be replicated and reproduced by the other researchers. The key terms of searching, search strategies (including names

of database, platforms, dates of search) and searching limits all need to be illustrated in the review. (Website of Charles Sturt University Library 2019.)

According to Curtin University library, eight steps are conducted of writing systematic literature review, which are: check for existing review, formulate specific questions, develop and register protocol, design search strategy, conduct literature search, select and critically appraise studies, extract and synthesise data, interpret and present findings, as it can be seen from the figure 1 (Website of Curtin University 2019). Formulate specific questions plays a key role in developing search strategy. The designed questions must focus on PICO mode, which stands for the patient or problem (P); the intervention or exposure (I); the compression intervention or exposure (C); the outcome of interest (O). Despite other searching models, PICO is the most widely used in clinical reasoning search. (Eriksen & Frandsen 2018, 420-431.)

After formulating the questions, literature search commonly done through varies database, the results will be narrowed done by applying inclusive and exclusive criteria. To define the criteria, the nature of the question needs to be posed, the type of the relevant study needs to be considered, and the bottle-line of acceptable study selection need to be concerned. The next step is to assess the quality of the remaining studies, in this case, Physiotherapy Evidence Database (PEDro) will be used. Following to the next step, a result will be concluded based on the remained and assessed studies. Then, the last step, to discuss the limitations, strength of the evidence, the risk of related bias, the consistency between the studies. (Website of University of Minnesota Library 2019).

Figure 1: Steps in a systematic review (Website of Curtin University 2019)

7.2 Search strategy

The search was done on 1.10.2019-2.10.2019. According to PICO mode, the key terms used are:

P= post stroke

I= acupuncture

C= conventional therapy

O= upper extremity motor function/motor recovery/motor rehabilitation/locomotor

A combination of the key words linked by “AND” “OR”: “acupuncture” AND “upper extremity (OR upper limb)” AND “motor function (OR motor recovery OR motor rehabilitation OR motor paretic OR locomotor)”, AND “post-stroke”. The research was done via several database, which are PubMed, ScienceDirect and Cochrane. Searching result could be seen on Table 1.

Table 1: The searching result from each database after key terms inputted.

Key term			**PubMed**	**ScienceDirect**	**Cochrane**
Acupuncture	AND Upper extremity motor function	AND poststroke	10	322	6
	AND Upper extremity motor recovery		4	266	1
	AND Upper extremity motor rehabilitation		9	268	6
	AND Upper limb motor recovery		4	268	2
	AND Upper limb motor rehabilitation		15	482	14
	AND Upper limb paretic		2	69	0
	AND Upper extremity locomotor		0	69	0

7.3 Study selection

1817 studies were found after inputting the key terms. Studies not in full text, or not in English originally was excluded. Other excluded criteria including PEDro scores less than 6/10, acute stroke, electroacupuncture, and dry needling. Table 2 presents the inclusive and exclusive criterias. Figure 2 demonstrates the more detailed selection process. 370 studies were peer viewed as they are acceptable study type and fulfil the criteria of full text and they are in English language. 3 studies remained after applying all exclusive and inclusive criteria.

Table 2: Inclusive and Exclusive criterias

	Criteria
1	The studies were originally in English language
2	Full text available
3	PEDro score 6/10 or more
4	The studies were concerned about upper extremity motor function rehabilitation AND acupuncture AND post-stroke
5	Acceptable article type: review articles, research articles, book chapters
6	Excluded electroacupuncture and dry needling
7	Upper extremity only
8	Not acute stroke

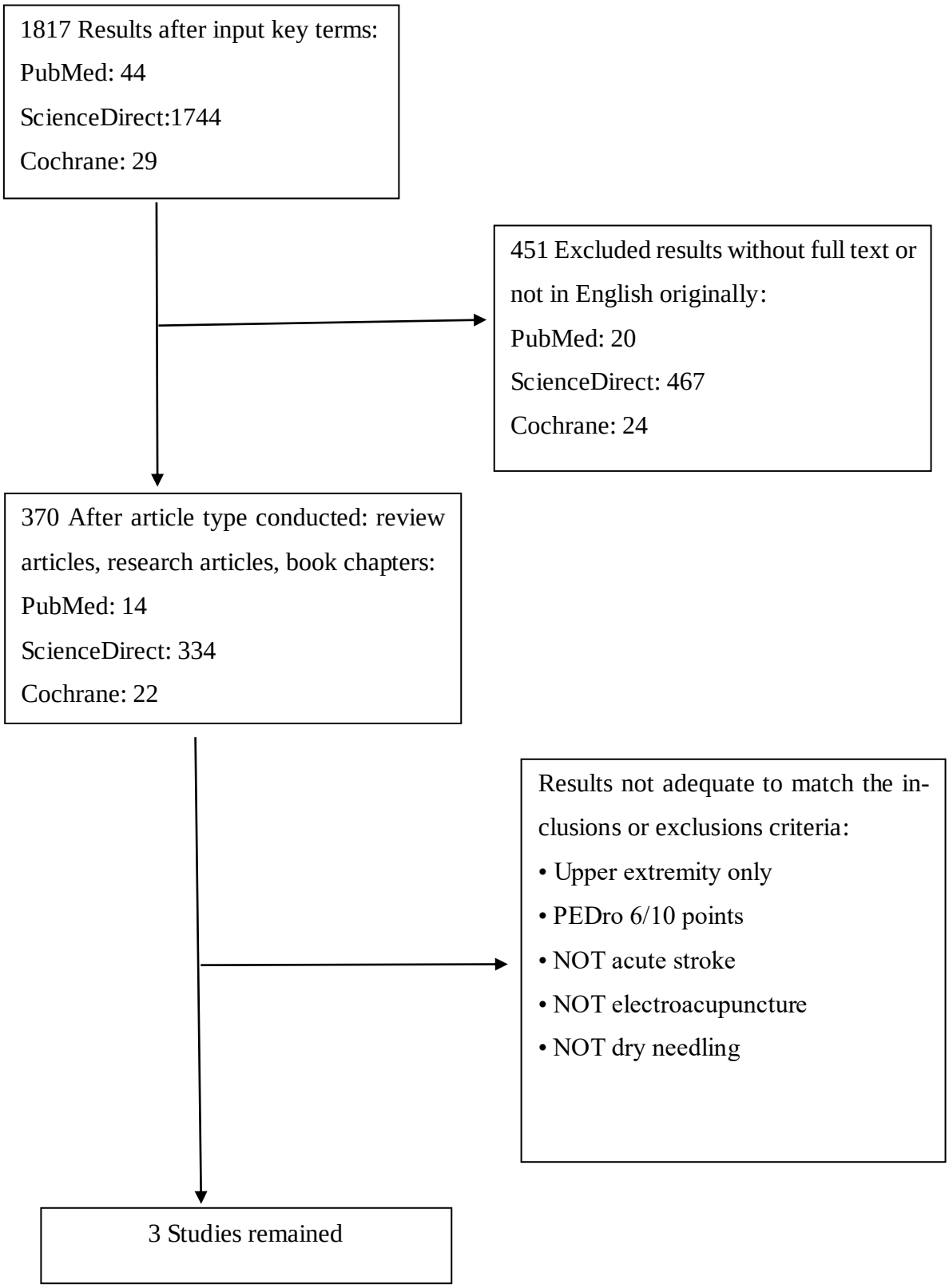


Figure 2: Flow of diagram of study selection

7.4 Methodological quality assessment

As mentioned above, Physiotherapy Evidence Database (PEDro) was used to evaluate the quality of the studies. PEDro is a free database with more than 44,000 publications, including randomized trails, systematic reviews and clinical practice guidelines in physiotherapy. It can assess all the trails independently, the quality rating helps to guide clinical practice and guide the users to select trails which are more valid for the related study. (Website of Physiotherapy Evidence Database 2019). The result of the methodological quality assessment can be seeing on Table 3.

Table 3: Methodological quality assessment by using PEDro.

	Criteria											
Study	1	2	3	4	5	6	7	8	9	10	11	Score
Wayne et al. 2005	1	11	1	1	1	0	1	0	1	1	1	8/10
Liu et al. 2019												N/A

N/A=Not Applicable

Within the 3 remining articles, only one study was assessable on PEDro, which scored 8 out of 10. One study was not rated, because it is systematic review (Website of Physiotherapy Evidence Database /selected record 2019). One study was not able to be found on PEDro, therefore, assessment was not available, and it is not listed on table 3. After contacting PEDro through email, the answer was given: the study is “a study protocol for a randomized control trail”, which is not adequate for indexing in PEDro (PEDro Resource 2019).

8 RESULT

The study done by Liu et al. used Fugl-Meyer Assessment for Upper Extremity (FMA-UE) as the primary outcome measurement. FMA-UE is one of the most common assessment being used to evaluate motor function level after stroke. FMA-UE scored higher in the group combined acupuncture with normal routine rehabilitation compared with rehabilitation alone. Pain visual analogue scale (VAS) has decreased when acupuncture combined with rehab comparing with rehab alone. Other positive result performed in the activities of daily life (ADL) assessment by using Barthel Index (BI) or Modified Barthel Index (MBI). However, the risk of bias remains high due to few reasons. Firstly, blinding of the acupuncture practitioner and participants was not implemented. Secondly, the selected studies did not publish study protocol, thus, lack of clear report. Thirdly, the parameter of applying acupuncture was not given. Lastly, the studies didn't provide long-term follow up report. (Liu et al.2019, 433).

A protocol for a randomize controlled study done by Xu et al. expected the synergistic result by combining acupuncture therapy (AT) and mirror therapy (MT). The parameters were described clearly in the protocol, five acupuncture points were applied to the participants. FMA-UE assessment was set as the primary outcome measurement, followed MBI as secondary outcome. Five aspects formed the quality control, in which are: informed consent, participants screening, intervention, statistical analysis, data management. Due to the property of the study, the result is unknown. (Xu et al. 2018. 285).

A small sample participated in the study done by Wayne et al., They compared sham acupuncture and traditional acupuncture, found no difference

between these two methods in upper extremity motor function rehabilitation after stroke. They both improve wrist and shoulder range of motion (ROM), wrist spasticity, and upper limb (UE) motor function, however, there was not improvement in quality of life (QOL). (Wayne et al. 2005. 2248-2255). The summary of the included articles is listed on Table 4.

Table 4: Summary of the included articles.

Author & Year of publishing	Study purpose	Study design	Subjects	Method	Results	Limitations
Liu et al. 2019	Evaluate the safety and efficacy of acupuncture for post stroke patients who diagnosed SHS syndrome	Randomize controlled trails (RCTs) or quasi-RCTs that are in English or Chinese language are included in the systematic review	Patients diagnosed post stroke SHS syndrome, or CRPS type I, with symptoms of pain, motor deficiency, and skin changes	The search was done through PubMed, Embase, CINAHL, CENTRAL, AMED, CBM, CNKI, CQVIP and Wanfang. The additional effects of acupuncture on the rehabilitation of post-stroke	According to FMA-UE, 29studies showed positive effects by using acupuncture combined with normal rehabilitation (MD: 8.01, 95% CI [6.69, 9.33]; I^2	The result was assessed, however, because the limitations of study design and inconsistency of the result, it's has low evidence quality; One of the included study

				SHS syndrome were discussed.	= 78%); Acupuncture along with rehabilitation had a superior effects on pain VAS, compared with rehabilitation alone (MD: −1.59, 95% CI [−1.86, −1.32]; I^2 = 87%); Acupuncture combined with rehabilitation works better	used placebo acupuncture, hence, there are possibility of placebo affect; The treatment sessions and period varies extraordinarily between the studies; The parameter of applying acupuncture was not given; Some of the study reported deficiencies of utilizing acupuncture, lead

					than rehabilitation alone from ADL aspect, Barthel Index (BI) or Modified Barthel Index (MBI) are used on the measurement of ADL; Acupuncture combined with routine rehabilitation increased Shoulder ABD by 11,94, IR 18,72, ER 15,73	to the consideration of safety; Last, no study provided long term follow up report.

					compared with rehabilitation alone.	
Xu et al. 2018	(1). The synergistic effects of AT and MT on upper limb function rehabilitation after stroke. (2). To find out the combination of AT and MT, or AT, MT alone has better outcome than conventional treatment	2 × 2 randomize controlled study.	136 patients fulfilled the criteria with UL motor function affected after stroke.	The subjects were divided into 4 groups randomly, (1) AT group, (2) MT group, (3) combination of AT & MT, (4) control group. Followed 1:1:1:1 ratio. All the groups received health education and conventional medical therapy. The implementation was done in 4weeks	Ongoing research	

	for upper limb recovery after stroke.			with 5 days/week, followed 12 weeks follow up. AT 15mins + MT 15mins were performed per day in combined group. Fugl-Meyer assessment for upper extremity (FMA-UE), Wolf motor function test (WMFT), Visual analogue scale (VAS), stroke impact scale (SIS), Modified Barthel Index (MBI), and adverse events are used as		

				measure-ment.		
Wayne et al. 2005	The ef-fects of tradi-tional Chinese acupunc-ture with sham ac-upunc-ture on upper limb (UL) function and qual-ity life for post stroke patient.	A pro-spective, sham-con-trolled, random-ize con-trolled tail.	33 pa-tients who car-ried 0,8-24 years of stroke, with up-per ex-tremity affected moder-ately or severely.	20 sessions (mean 16,9) within a mean of 10,5 weeks treatment by using traditional Chinese ac-tive acu-puncture, including sham acu-puncture. The meas-urement in-cluding UL motor func-tion, spas-ticity, grip strength, ROM, daily living activ-ities, QOL, and mood. The out-come was measured, as well as the baseline	No dif-ferences were found be-tween ac-tive acu-puncture and sham acupunc-ture; Sig-nificant improve-ment of wrist spasticity (P<.01) in active acupunc-ture group; Improve-ment of wrist & shoulder ROM (P<.01) in active acupunc-ture group;	The num-ber of subjects is lim-ited, same de-sign with larger partici-pants will be more reliable.

				was recorded.	UL motor function (P=.09) and digit ROM (P=.06). However, acupuncture does not improve QOL.	

SHS=shoulder-hand syndrome; CRPS=complex reginal pain syndrome; FMA-UE=Fugl-Meyer Assessment for Upper Extremity; VAS=Visual Analogue Scale; ROM=range of motion; QOL=quality of life; ADL=activities of daily living; ABD=abduction; IR=internal rotation; ER=external rotation; AT=acupuncture therapy; MT=mirror therapy

9 CONCLUSION

To sum up, there is no clear evidence to support the fact that acupuncture improves upper extremity motor function rehabilitation in post stroke patients. Even though one study concluded FME-UE improvement which is the main measurement of upper extremity motor function. However, the limitations and bias cannot be neglected in this study, such as unclear reporting of the study protocol, blinding setting, parameter setting, and fol-

low up report were not provided. The other study concluded that acupuncture improves ROM, nevertheless, small samples are used in the study, and it is considered as the limitation of the study. In the future, factors causing bias or limitations maintained above need to be avoid in the study.

10 DISCUSSION

During the procedure of writing the thesis, lots of studies concerning the effects of utilizing acupuncture in motor function rehabilitation after stroke were found. The majority of the studies are done in China, and they conclude the improvement by using acupuncture. However, the quality of the study has being questioned, due to the study design, study samples, parameter setting, data analysing, and report recording. On the other hand, certainly, for the last two thousand years, acupuncture played an important role in Chinese medical and health care field, the positive effects by using acupuncture has its clinical evidence (Website of American Academy of Medical Acupuncture 2019). Hence, it's difficult to say whether acupuncture has benefits or not.

The study selection was based on varies criteria, the year of publishing had to change from recent five years studies to none limitation. Otherwise, the searching result combined with other criteria, left only one completed study, and it's not entitled to be assessed by PEDro, which conducts to very low evidence-based result. After changing the criteria of the publishing year, three studies remained, one study protocol, one systematic review, and one randomized controlled study, only the randomised controlled study scored 8 through PEDro quality assessment.

The review was about acupuncture in motor function rehabilitation in post stroke initially, until it being noticed that write about motor function rehabilitation through whole human body was still a wide topic in theory, therefore, the topic had been narrowed down to upper extremity motor function rehabilitation. Unfortunately, after applying all the criteria in the searching process, only 3 studies remained in the searching result, furthermore, only one study scored 8 in the quality assessment, which conducts to low reliability of the review. It was needed to select the topic thoughtfully.

There are lots of studies about upper extremity motor function rehabilitation after stroke, however, the original language was written in Chinese, therefore, they are excluded during the study selection. It reflects that the studies concerning acupuncture is remained in China mainly, more investigations are needed in the western countries.

Until today, acupuncture is considered an alternative treatment for post stroke patient. Acupuncture used in China followed a completely different theory comparing to western acupuncture. The theory of “yin” and “yang”, and meridian are described in acupuncture in China. However, western scientists found it difficult to identify meridian because it hardly corresponds with nerve or blood circulation pathways. (Website of American Academy of Medical Acupuncture 2019). Even though acupuncture has been used in physiotherapy for nearly 40 years, yet, no clear evidence was provided to clarify the effects of acupuncture (Website of Physiopedia 2019). Thus, a huge gap of understanding acupuncture should be considered between these two worlds. In the future, more studies need to be investigated with the professions from eastern and western world.

REFERENCES

Al-Ghimlas, F. 2013. The Philosophy of Evidence-Based Clinical Practice: Is Evidence Enough? Annals of Thoracic Medicine 3, 131-132. Referred 23.9.2019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3731853/

Barnes, P. M., Dobkin, H. B. & Bogousslavsky, J. 2005. Recovery after stroke. New York: Cambridge University Press 2005. Referred 15.1.2019. https://books.google.fi/books?id=VSfp2nYJsbMC&pg=PA172&dq=acupuncture+post-stroke&hl=en&sa=X&ved=0ahUKEwjnk9ehgPDfAhVLAhAIHXBzB7gQ6AEILjAB#v=onepage&q=acupuncture%20post-stroke&f=false

Barrett, M. B. & Meschia, F. J. 2013. Stroke. West Sussex: Wiley-Blackwell. Referred 13.11.2019. https://ebookcentral.proquest.com/lib/samk/reader.action?docID=1120065

Caplan, R. L. 2006. Stroke. New York: Demos Medical Publishing. Referred 15.1.2019. https://ebookcentral.proquest.com/lib/samk/reader.action?docID=289786

Chave, L. M., Huang, S. S., MacDonald, I., Lin, J. G., Lee, Y. C. & Chen, Y.H. 2017. Mechanisms of Acupuncture Therapy in Ischemic Stroke Rehabilitation: A Literature Review of Basic Studies. International Journal of Molecular Sciences 11, 2270. Referred 15.1.2019. https://www.ncbi.nlm.nih.gov/pubmed/29143805

Eriksan, B. M & Frandsen, F. T. 2018. The impact of patient, intervention, comparison, outcome (PICO) as a search strategy tool on literature search quality: a systematic review. Journal of the medical association 4, 420-431. Referred 1.10.2019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6148624/

Gough, A. D., Oliver, S & James, T. 2012. An introduction to systematic reviews. London: SAGE.

Mendelow, H. E., Sacco, D. A. & Wong, K. S. L. 2013. Stroke: Pathophysiology, diagnosis, and treatment. Cambridge: Elsevier Health Sciences. Referred 13.11.2019. https://books.google.com.au/books?id=EmFyCgAAQBAJ&printsec=frontcover&dq=stroke&hl=en&sa=X&ved=0ahUKEwj1l9u_5eblAhXHs4sKHTmbC9cQ6AEIMDAB#v=onepage&q=stroke&f=false

Hong, H. 2013. Acupuncture: Theories and Evidence. Singapore: World Scientific Publishing Co. Pte. Ltd. Referred 23.9.2019. https://ebookcentral.proquest.com/lib/samk/reader.action?docID=1168154

Hennerici, G. M., Binder, J., Kern, R. & Szabo, K. 2012. Stroke. Oxford: Oxford University Press USA – OSO. Referred 15.1.2019. https://ebookcentral.proquest.com/lib/samk/reader.action?docID=1591392

Hatem, M. S., Saussez, G., Faille, d. M., Prist, V., Zhang, X., Dispa, D., Bleyenheuft, Y. 2016. Rehabilitation of Motor Function After Stroke: A Multiple Systematic Review Focused on Techniques to Stimulate Upper Extremity Recovery. Frontiers in Human Neuroscience 10, 442. Referred 26.2.2019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5020059/

Krakauer, W. J. & Carmichael, S. T. 2017. Broken Movement: the neurobiology of motor recovery after stroke. London: The MIT Press Cambridge. Referred 24.7.2019. https://books.google.com.au/books?id=Mpg-DwAAQBAJ&printsec=frontcover&dq=hand+motor+recovery+in+stroke&hl=en&sa=X&ved=0ahUKEwjqtZfYn83jAhXhAmMBHX3-Cd0Q6AEIKjAA#v=onepage&q=hand%20motor%20recovery%20in%20stroke&f=false

Leung, P. C. & Liu, T. Y. 2013. Evidence-Based Acupuncture. Singapore: World Scientific Publishing Co. Pte. Ltd. Referred 26.2.2019. https://ebookcentral.proquest.com/lib/samk/reader.action?docID=1143317

Liu, S. N., Zhang, C. S. Q., Cai, Y. Y., Guo, X. F., Zhang, A. L., Xue, C. C. L. & Liu, C. J. 2019. Acupuncture for post-stroke shoulder-hand syndrome: a systematic review and meta-analysis. Frontiers in Neurology 8. 433. Referred 22.10.2019. https://www.frontiersin.org/articles/10.3389/fneur.2019.00433/full

Physiotherapy Evidence Database. PEDro Website – English. Receiver: bin.bin@student.samk.fi. Sent 11.10.2019 7:33 AM. Referred 13.10.201

Raghavan, P. 2015. Upper Limb Impairment After Stroke. Physical Medicine and Rehabilitation Clinics of North America 4, 599-610. Referred https://www.sciencedirect.com/science/article/abs/pii/S1047965115000558?via%3Dihub

Stinear, C. M., Byblow, W. D. & Ward, S.D. 2014. An Update on Predicting Motor Recovery After stroke. Annals of Physical and Rehabilitation Medicine. 8. 489-498. Referred 19.7.2019. https://www.sciencedirect.com/science/article/pii/S1877065714017606

Stein, J., Harvey, L. J., Marco, F. R., Winstein, J. C. & Zorowitz, D. R. 2009. Stroke Recovery & Rehabilitation. New York: Demos Medical. Referred 19.7.2019. https://books.google.com.au/books?id=pdSS-qBtc06oC&printsec=frontcover&dq=motor+function+regain+in+stroke+patient&hl=en&sa=X&ved=0ahUKEwia582jksHjAhWhQkEAHWavBCgQ6AEILzAB#v=onepage&q&f=false

Torbey, T. M. & Selim, H. M. 2013. The stroke book. Cambridge: Cambridge university press. Referred 13.11.2019. https://books.google.com.au/books?id=PHeR0MWHHxkC&printsec=frontcover&dq=stroke&hl=en&sa=X&ved=0ahUKEwi9tYTt0OflAhUMlIsKHT-MQCgAQ6AEIKTAA#v=onepage&q=stroke&f=false

Veldema, J., Bösl, K. & Nowak, A. D. 2017. Motor Recovery of the Affected Hand in Subacute Stroke Correlates with Changes of Contralesional Cortical Hand Motor Representation. Neural Plasticity. Referred 23.7.2019. https://www.hindawi.com/journals/np/2017/6171903/

World Health Organization. 2002. Acupuncture: Review and Analysis of Reports on Controlled Clinical Trail. World Health Organization. Referred 24.11.2019. https://ebookcentral.proquest.com/lib/samk/detail.action?docID=284646.

Wayne, P. M., Krebs, D. E., Marcklin, E. A., Kaptchuk, T. J., Parker, S. W., Scarborough, D. M., McGibbon, C. A., Schaechter, J. D., Stein, J. & Stason, W. B. 2005. Acupuncture for upper-extremity rehabilitation in chronic stroke: a randomized sham-controlled study. Archives of Physical Medicine and Rehabilitation 12, 2248-2255. Referred 22.10.2019. https://www.ncbi.nlm.nih.gov/pubmed/16344019

Website of the American Academy of Medical Acupuncture. Referred 15.1.2019. https://www.medicalacupuncture.org/For-Patients/Articles-By-Physicians-About-Acupuncture/Acupuncture-in-Stroke-Treatment

Website of Stroke Foundation. Referred 15.2.2019. https://enableme.org.au/Resources/Types-of-stroke

Website of WebMD. Referred 21.9.2019. https://www.webmd.com/migraines-headaches/qa/what-is-the-definition-of-acupuncture

Website of Charles Sturt University Library. Referred 25.9.2019. https://libguides.csu.edu.au/c.php?g=476545&p=3997202

Website of Curtin University. Referred 1.10.2019. https://libguides.library.curtin.edu.au/c.php?g=863554&p=6191897

Website of University of Minnesota Library. Referred 4.10.2019. https://hsl.lib.umn.edu/biomed/help/systematic-review

Website of Physiotherapy Evidence Database. Referred 7.10.2019. https://www.pedro.org.au/

Website of Physiotherapy Evidence Database. Referred 13.10.2019. https://search.pedro.org.au/search-results/selected-records.

Xia, Y., Cao, X. D., Wu, G. C. & Cheng, J. S. 2010. Acupuncture therapy for neurological diseases: A neurobiological view. Beijing: Tsinghua University Press. Referred 14.10.2019. https://books.google.com.au/books?id=yRIQ5aE-aZEC&pg=PA236&dq=acupuncture+stroke&hl=en&sa=X&ved=0ahUKEwiQ2beG-5vlAhVL1qYKHbAFC74Q6AEINzAC#v=onepage&q=acupuncture%20stroke&f=false

Xu, J., Ejaz, N., Hertler, B., Branschedit, M., Widmer, M., Faria, V. A., Harran, D. M., Cortes, C. J., Kim, N., Celnik, A. P., Kitago, T., Luft, R. A., Krakauer, W. J. & Diedrichsen, J. 2017. Separate system for recovery of finger strength and control after stroke. Neurophysiology. 2. 1151-1163. Referred 24.7.2019. https://www.physiology.org/doi/full/10.1152/jn.00123.2017

Xu, Y., Lin, S. F., Jiang, C., Ye, X. Q., Tao, J., Wilfried, S., Wong, A. W. K., Chen, L. D. & Yang, S. L. 2018. Synergistic effect of acupuncture and mirror therapy on post-stroke upper limb disfunction: a study protocol for a randomized controlled trail. BioMed Central 19. 285. Referred 22.10.2019. https://trialsjournal.biomedcentral.com/articles/10.1186/s13063-018-2585-8

APPENDICES

PEDro scale

1.	eligibility criteria were specified	no ❑ yes ❑ where:
2.	subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	no ❑ yes ❑ where:
3.	allocation was concealed	no ❑ yes ❑ where:
4.	the groups were similar at baseline regarding the most important prognostic indicators	no ❑ yes ❑ where:
5.	there was blinding of all subjects	no ❑ yes ❑ where:
6.	there was blinding of all therapists who administered the therapy	no ❑ yes ❑ where:
7.	there was blinding of all assessors who measured at least one key outcome	no ❑ yes ❑ where:
8.	measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	no ❑ yes ❑ where:
9.	all subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by "intention to treat"	no ❑ yes ❑ where:
10.	the results of between-group statistical comparisons are reported for at least one key outcome	no ❑ yes ❑ where:
11.	the study provides both point measures and measures of variability for at least one key outcome	no ❑ yes ❑ where:

The PEDro scale is based on the Delphi list developed by Verhagen and colleagues at the Department of Epidemiology, University of Maastricht (*Verhagen AP et al (1998). The Delphi list: a criteria list for quality assessment of randomised clinical trials for conducing systematic reviews developed by Delphi consensus. Journal of Clinical Epidemiology, 51(12):1235-41*). The list is based on "expert consensus" not, for the most part, on empirical data. Two additional items not on the Delphi list (PEDro scale items 8 and 10) have been included in the PEDro scale. As more empirical data comes to hand it may become possible to "weight" scale items so that the PEDro score reflects the importance of individual scale items.

The purpose of the PEDro scale is to help the users of the PEDro database rapidly identify which of the known or suspected randomised clinical trials (ie RCTs or CCTs) archived on the PEDro database are likely to be internally valid (criteria 2-9), and could have sufficient statistical information to make their results interpretable (criteria 10-11). An additional criterion (criterion 1) that relates to the external validity (or "generalisability" or "applicability" of the trial) has been retained so that the Delphi list is complete, but this criterion will not be used to calculate the PEDro score reported on the PEDro web site.

The PEDro scale should not be used as a measure of the "validity" of a study's conclusions. In particular, we caution users of the PEDro scale that studies which show significant treatment effects and which score highly on the PEDro scale do not necessarily provide evidence that the treatment is clinically useful. Additional considerations include whether the treatment effect was big enough to be clinically worthwhile, whether the positive effects of the treatment outweigh its negative effects, and the cost-effectiveness of the treatment. The scale should not be used to compare the "quality" of trials performed in different areas of therapy, primarily because it is not possible to satisfy all scale items in some areas of physiotherapy practice.

Last amended June 21st, 1999

Notes on administration of the PEDro scale:

All criteria	**Points are only awarded when a criterion is clearly satisfied**. If on a literal reading of the trial report it is possible that a criterion was not satisfied, a point should not be awarded for that criterion.
Criterion 1	This criterion is satisfied if the report describes the source of subjects and a list of criteria used to determine who was eligible to participate in the study.
Criterion 2	A study is considered to have used random allocation if the report states that allocation was random. The precise method of randomisation need not be specified. Procedures such as coin-tossing and dice-rolling should be considered random. Quasi-randomisation allocation procedures such as allocation by hospital record number or birth date, or alternation, do not satisfy this criterion.
Criterion 3	*Concealed allocation* means that the person who determined if a subject was eligible for inclusion in the trial was unaware, when this decision was made, of which group the subject would be allocated to. A point is awarded for this criteria, even if it is not stated that allocation was concealed, when the report states that allocation was by sealed opaque envelopes or that allocation involved contacting the holder of the allocation schedule who was "off-site".
Criterion 4	At a minimum, in studies of therapeutic interventions, the report must describe at least one measure of the severity of the condition being treated and at least one (different) key outcome measure at baseline. The rater must be satisfied that the groups' outcomes would not be expected to differ, on the basis of baseline differences in prognostic variables alone, by a clinically significant amount. This criterion is satisfied even if only baseline data of study completers are presented.
Criteria 4, 7-11	*Key outcomes* are those outcomes which provide the primary measure of the effectiveness (or lack of effectiveness) of the therapy. In most studies, more than one variable is used as an outcome measure.
Criterion 5-7	*Blinding* means the person in question (subject, therapist or assessor) did not know which group the subject had been allocated to. In addition, subjects and therapists are only considered to be "blind" if it could be expected that they would have been unable to distinguish between the treatments applied to different groups. In trials in which key outcomes are self-reported (eg, visual analogue scale, pain diary), the assessor is considered to be blind if the subject was blind.
Criterion 8	This criterion is only satisfied if the report explicitly states *both* the number of subjects initially allocated to groups *and* the number of subjects from whom key outcome measures were obtained. In trials in which outcomes are measured at several points in time, a key outcome must have been measured in more than 85% of subjects at one of those points in time.
Criterion 9	An *intension to treat* analysis means that, where subjects did not receive treatment (or the control condition) as allocated, and where measures of outcomes were available, the analysis was performed as if subjects received the treatment (or control condition) they were allocated to. This criterion is satisfied, even if there is no mention of analysis by intention to treat, if the report explicitly states that all subjects received treatment or control conditions as allocated.
Criterion 10	A *between-group* statistical comparison involves statistical comparison of one group with another. Depending on the design of the study, this may involve comparison of two or more treatments, or comparison of treatment with a control condition. The analysis may be a simple comparison of outcomes measured after the treatment was administered, or a comparison of the change in one group with the change in another (when a factorial analysis of variance has been used to analyse the data, the latter is often reported as a group × time interaction). The comparison may be in the form hypothesis testing (which provides a "p" value, describing the probability that the groups differed only by chance) or in the form of an estimate (for example, the mean or median difference, or a difference in proportions, or number needed to treat, or a relative risk or hazard ratio) and its confidence interval.
Criterion 11	A *point measure* is a measure of the size of the treatment effect. The treatment effect may be described as a difference in group outcomes, or as the outcome in (each of) all groups. *Measures of variability* include standard deviations, standard errors, confidence intervals, interquartile ranges (or other quantile ranges), and ranges. Point measures and/or measures of variability may be provided graphically (for example, SDs may be given as error bars in a Figure) as long as it is clear what is being graphed (for example, as long as it is clear whether error bars represent SDs or SEs). Where outcomes are categorical, this criterion is considered to have been met if the number of subjects in each category is given for each group.