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Research Article

Evidence of Manual Physical Therapy, the Trend of the Last Twenty Years

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Abstract

Manual Physical Therapy (PT) programs take important parts of PT and applied many types of physical disorders. A purpose of this article is to search evidence of manual or manipulative PT programs and to confirm their applications. A systematic literature search was performed for relevant articles in Physiotherapy Evidence Database (PEDro) for articles of systematic reviews and clinical trials. Selected articles were categorized in following aspects, 1) year of publication and divided two periods which were before 2010 and from 2011 to 2021, 2) divisions of disorders or impairments, and 3) programs of PT practices, and 4) evidence levels. Selected articles indicated evidence levels as following: 'strong evidence', 'moderate evidence', 'weak evidence or unclear', and 'no evidence or no report'. PEDro selected 96 articles includeing 38 before 2010 and 84 after 2011. Evidence of PT programs before 2010 showed that strong evidence was two (4%), moderate evidence was 35 (49%), poor or unclear evidence was 27 (38%) and no evidence or no research was 7 (10%). Evidence from 2011 to 2021 indicated strong evidence was 19 (10%) articles, moderate evidence was 95 (52%), and week evidence/unclear evidence was 46 (26%) and no evidence/no report was 14 in total.

Keywords: Evidence; Manual therapy; Manipulative therapy

Introduction

Evidence based Physical Therapy (PT) is required recently in the field of medicine. Useful data base of medicine has been supplied and Physiotherapy Evidence Database (PEDro) has been clinically used to search evidence. Manual PT programs take important parts of PT and these are applied many types of physical disorders. A purpose of this article is to search evidence of manual or manipulative PT programs and to confirm their applications.

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Methods

Search Strategy

A systematic literature search was performed for relevant articles in PEDro for articles of systematic reviews and clinical trials at January 2020, July and August 2021 and January 2022. Search terms included 'manual therapy', 'manipulative therapy' and 'evidence'. These results of search indicated many physical therapy (PT) programs, not only manual therapy or manipulative therapy, but also PT exercises, muscle strength training, acupuncture, balneotherapy, and so on. Therefore, following categorization was used after search.

Categorization

Selected articles were categorized in following aspects, 1) year of publication and divided two periods which were before 2010 and from 2011 to 2021, 2) areas of disorders or impairments, and 3) programs of PT practices and 4) evidence levels.

Grading of evidence levels

All selected articles indicated evidence levels as following: 'strong evidence', 'moderate evidence', 'weak evidence or unclear', and 'no evidence or no report'. Therefore, evidence levels of this report were also used the same grading system as above.

Results

According to article search from PEDro, 96 articles were selected in total [1-96]. All searched articles of EBM were used as code numbers of articles in tables 1-3, because many of searched articles reported plural disorders and/or impairments of different divisions of the body and PT programs. There were 49 divisions or areas of disorders and/or impairments in the results of search (Table 1). Table 1 also indicated that articles of EBM were 38 before 2010 and 84 after 2011. Seven articles of six disorders were searched only before 2010, 39 articles of 26 new disorders were additionally searched from 2011 to 2021, and 75 articles of 16 disorders in the both periods.

Evidence of PT programs before 2010 in table 2 indicated 66 systematic reviews, 4 clinical trials, and 70 articles in total. The evidence showed that strong evidence was two (4%) PT programs, including aerobic exercise and cognitive behavioral therapy for fibromyalgia syndrome and a course of spinal manipulation or mobilization for chronic neck pain. Therefore, only one article of manual therapy was reported in this period of year. Moderate evidence was 35 (49%) of PT programs for 15 disorders, and 18(25%) manual PT and 21 articles. Poor or unclear evidence was 27 (38%) of PT programs for 13 disorders and 16 (23%) of manual PT and 16 articles. No evidence or no research was 7 (10%) systematic reviews of PT programs and 5 (7%) of manual PT and 5 articles.

	Divisions, areas of disorders and/or impairments		**Before 2010**			**After 2011**		**Only**		**Only**		**Both**	
			# Articles	Code # of article		# Articles	Code # of article	before 2010	# Articles	after 2011	# Articles	periods	# Articles
1	Asthma and allergy	1	1	4				1	1				
2	Chronic pain	1	1	70				1	1				
3	Fibromialgia	1	1	32				1	1				
4	Insomia	1	1	57				1	1				
5	Paediatric health conditions	1	2	36, 37				1	2				
6	Therapeutic benefit of the audible release	1	1	69				1	1				
7	Ankle and foot	1	2	12, 38	1	4	1, 20, 30, 51					1	6
8	Elbow	1	4	17, 19, 47, 64	1	3	11, 31, 63					1	7
9	Headache	1	1	29	1	1	14					1	2
10	Infants with kinetic imbalance due to sub-occipital strain	1	1	9	1	1	22					1	2
11	Low back pain	1	7	3, 21, 33, 49, 54, 56, 65	1	12	6, 25, 26, 39, 48, 58, 72, 73, 74, 75, 76, 89					1	19
12	Lower extremities	1	1	12	1	1	42					1	2
13	Myofascial pain	1	1	87	1	1	7					1	2
14	Neck	1	2	88, 89	1	2	16, 18					1	4
15	Neck pain	1	1	50	1	5	8, 13, 23, 52, 96					1	6
16	Neck pain (acute)	1	2	44, 84	1	1	13					1	3
18	Neck pain (clonic)	1	2	85, 86	1	2	13, 59					1	4
19	Neurological disorders	1	1	27	1	2	93					1	3
20	Pregnance related disorders	1	1	56	1	1	43					1	2
21	Shoulder	1	3	61, 62, 88	1	6	10, 34, 45, 66, 71, 92					1	8
22	Suboccipital area	1	1	9	1	1	28					1	2
23	Wrist	1	1	15	1	2	11, 93					1	3
24	Cervical headache				1	3	5, 60, 68			1	3		
25	Childhood respiratory disease				1	1	66			1	1		
26	Chronic musculoskeletal pain in female breast cancer survivors				1	1	67			1	1		
27	Chronic obstructive airways disease (COPD)				1	3	46, 90, 91			1	3		
28	Cost-effectiveness of manual therapy for the management of musculoskeletal conditions				1	1	82			1	1		
29	Cranium				1	1	28			1	1		
30	Disorders of the spinal disc				1	1	59			1	1		
31	Hypertension the blood pressure				1	1	31			1	1		
32	Manipulation-induced hypoalgesia in musculoskeletal pain populations				1	1	2			1	1		
33	Mechanical neck pain				1	1	94			1	1		
34	Musculoskeletal disorders				1	2	83, 93			1	2		
35	Musculoskeletal pain				1	3	2, 80, 95			1	3		
36	Neck and arm pain				1	1	55			1	1		
37	Non-musculoskeletal disorders				1	1	24			1	1		
38	Pain				1	1	78			1	1		
39	Pain and range of motion				1	1	79			1	1		
40	Paterofemoral pain				1	1	77			1	1		
41	Phonophobia				1	1	28			1	1		
42	Photophobia				1	1	28			1	1		

43	Postpartum-related low back, pelvic girdle, or combination pain				1	1	91			1	1		
44	Primary or early secondary prevention				1	1	35			1	1		
45	Restless legs syndrome (RLS)				1	1	41			1	1		
46	Spine				1	2	40, 81			1	2		
47	Thorax and chest				1	4	18, 53, 67, 81			1	4		
48	TMJ				1	2	11, 31			1	2		
49	Upper extremities				1	2	18, 23			1	2		
	Total	22	38		43	84		6	7	26	39	16	75

Table 1: Articles of Manual Physical Therapy Cited from PEDro.

Research methodology and disorders				**Programs of physical therapy practices**	**M**	**M**	**O**	**Level of evidence**					**# Articles**	**Code # of article**	
						& O		(++)	(+)	(+/-)	(-)	Notes			
Systematic review															
	1	Tension headache		Manual therapies	1					1			1	29	
	2	Infants with kinetic imbalance due to suboccipital strain (KISS) syndrome.		Manual therapy/Chiropractic/ Osteopathy	1						1		1	9	
	3	Chronic pain		Osteopathic manual treatmen	1				1				1	70	
	4	Fibromyalgia syndrome		Aerobic exercise and cognitive behavioral therapy			1	1					1	77	
				Massage	1				1				1	77	
				Muscle strength training,			1		1				1	77	
				Acupuncture			1		1				1	77	
				Spa therapy (balneotherapy).			1		1				1	77	
				Spinal manipulation	1					1			1	77	
				Manipulation	1					1			1	77	
				Movement/body awareness			1			1			1	77	
				Vitamins			1			1			1	77	
				Herbs			1			1			1	77	
				Dietary modification			1			1			1	77	
	5	Neck pain		Educational videos, mobilization, and exercises, low-level laser therapy		1			1				1	50	
	6	Acute neck pain		Chiropractic manipulation	1					1			1	44	
	7	Chronic neck pain		A course of spinal manipulation or mobilization at 6, 12, and up to 104 weeks posttreatment.	1			1	1				1	84	
				Mobilization	1				2				2	85	86
				Manipulation	1				2				2	85	86
	8	Chronic mechanical neck pain		A single session of spinal manipulation.	1				1				1	83	
				Mobilization	1					1			1	83	
				Ischemic compression	1					1			1	83	
				A single session of massage or manual traction	1						1		1	83	

	9	Non-specific chronic neck pain		Preventive spinal manipulative therapy (SMT)	1					1			1	58	
	10	Neck conditions		Thoracic spine manipulation	1										
	11	Neck disorder		Thoracic manipulation	1				1				1	89	
	12	Whiplash-associated disorders		Educational videos, mobilization, and exercises			1		1				1	50	
	13	Whiplash-associated disorders without arm disorders		Interventions that focused on regaining function as soon as possible			1		1				1	50	
							1								
							1								
	14	Chronic neck pain after whiplash		Manipulation and ischemic pressure	1				1			Immediate	1	85	
				Mobilization	1					1			1	85	
				Ischemic pressure	1					1			1	85	
	15	Chronic neck pain not due to whiplash and without arm pain and headaches		A course of spinal manipulation or mobilization	1				1			At 6, 12, and up to 104 weeks posttreatment	1	84	
	16	Low back pain		Chiropractic manipulation	1						1		1	3	
				Deep dry needling			1			1			1	89	
			Acute low back pain	Physical therapist-directed therapeutic exercises			1				1		1	21	
			Non-specific low back pain	Specific exercise interventions			1		1				1	49	
				Manual therapy	1					1			1	54	
			Chronic low back pain	Combined manipulation, stabilizing exercises, and physician consultation		1			1				1	64	
			Chronic low back pain due to spinal disk degeneration	Spinal mobilization	1				1				1	57	
	17	Shoulder conditions			1					1			1	88	
	18	Non-specific shoulder pain		Thoracic manual therapy	1				1				1	65	
	19	Lateral epicondylalgia.		Mobilization with movements (MWMs)	1				2			Short/ Long term	2	17	47
				Manipulative therapy at the cervical spine	1					1		Short term	1	47	
	20	Lateral epicondylopathy		Deep transverse friction massage with Mill's manipulation	1				1				1	63	
	21	Chronic lateral epicondylalgia		Specific manipulative therapy	1				1			Pain-free grip strength	1	87	
	22	Shoulder impingement symptoms		Facilitatory taping with routine physiotherapy			1		1			Short term	1	61	
	23	Carpal tunnel syndrome		Graston Instrument-assisted soft tissue mobilization (GISTM)	1				1				1	15	
				Soft tissue mobilization (STM)	1				1				1	15	

	24	Hip osteoarthritis		Manipulative therapy combined with multimodal or exercise therapy		1				1			1	12	
	25	Knee osteoarthritis		Manipulative therapy of the knee and/or full kinetic chain		1			1				1	12	
	26	Patellofemoral pain syndrome,		Manipulative therapy of the knee and/or full kinetic chain		1			1				1	12	
	27	Ankle inversion sprain		Manipulative therapy of the knee and/or full kinetic chain		1			1				1	12	
	28	Plantar fasciitis		Manipulative therapy of the knee and/or full kinetic chain		1				1			1	12	
	29	Metatarsalgia		Manipulative therapy of the knee and/or full kinetic chain		1				1			1	12	
	30	Hallux limitus/rigidus		Manipulative therapy of the knee and/or full kinetic chain		1				1			1	12	
	31	Hallux abducto valgus		Manipulative therapy of the ankle and/or foot combined with multimodal or exercise therapy		1					1		1	12	
	32	Morton's neuroma		Manipulation and mobilization	1				1			Short term	1	38	
	33	Neural dysorders		Neural mobilization.			1			1			1	27	
	34	Paediatric health conditions		Chiropractic manipulation	1					2			2	36	37
	35	Pregnancy-related back and pelvic pain		Complementary manual therapies	1					1			1	43	
	36	Insomnia		Chiropractic manual therapy	1					1			1	56	
	37	Asthma and allergy		Chiropractic care	1						1		1	4	
	38	Therapeutic benefit of the audible release		Spinal manipulative therapy	1						1		1	69	
	39	Painful musculoskeletal disorders					1				1		1	93	
				Subtotal	38	10	17	2	32	26	7	67	67		
Clinical trials															
	40	Fibromyalgia syndrome		Osteopathic manipulative treatment with other forms of standard medical care		1			1				1	32	
				Osteopathic manipulative treatment	1					1			1	32	
	41	Forward bending range		Passive physiological flexion technique			1		1				1	33	
				Manual therapy directed at the elbow and cervicothoracic spine	1				1				1	19	
				Subtotal	2	1	1	0	3	1	0	4	4		
				Total	40	11	18	2	35	27	7	71	71		
				%	56	15	26	3	49	38	10	100			

Table 2: Evidence before 2010.

Research methodology and disorders				Programs of physical therapy practices	M	M	O	Level of evidence					# Articles	Code # of
						& O		(++)	(+)	(+/-)	(-)	Notes		article
Sys-matic review														
	1	Temporoman-dibular joint disorders		Manipulative and multimodal therapy		1			1			Short term	1	11
	2	Cervicogenic headache		Cervical manipu-lation and mobili-zation	1				1				1	68
				Self-applied cervical mobilization	1				1				1	68
				Cervico-scapular strengthening					1				1	68
				Cervical and thorac-ic manipulation	1				1				1	68
				Cervical ma-nipulation and mobilization with cervico-scapular strengthening		1		1					1	68
	3	Cervical range of motion and mouth opening.		Cervical high-veloc-ity low-amplitude techniques (HVLA)	1				1				1	31
	4	Pain relief		Manipulative ther-apy	1				1			Immedi-ately	1	78
					1					1		Short term-fol-low-up.	1	78
	5	Asthma		Manipulative ther-apy	1						1	Disabil-ity and perceived (asthma) recovery.	1	78
	6	The audible release associated with spinal manipulative therapy		Spinal manipulative therapy	1						1		1	69
	7	Tension-type headache		Chiropractic treatment	1					1			1	14
	8	Pain at rest		A single session of joint mobilization	1				1				1	79
	9	Pain with most painful movement		A single session of joint mobilization	1				1				1	79
	10	Lower limb neurodynamic test outcomes in adults		Spinal manipulative therapy	1					1			1	60
				Spinal manipulation	1				1			Short-term	1	59
	11	Neck pain		Manipulation, manual therapy, and exercise in combina-tion with other modalities		1		1					1	13

				Home exercise programs: self-mobilizations, therapeutic exercise to reduce neck pain, function, and disability and improving QOL					1				1	96
				Directional manipulation to the thoracic spine.	1						1		1	52
				Mobilization as well as massage in combination with other therapies		1			1				1	13
				Mobilization or manipulation techniques	1				1				1	73
			Acute neck pain	Exercise alone						1			1	13
				Manipulation and mobilization in combination with other modalities.		1			1				1	13
				Exercise alone						1			1	13
				Thoracic manipulation	1						1		1	13
				Trigger point therapy	1						1		1	13
			Chronic neck pain	Manipulation, manual therapy, and exercise in combination with other modalities		1		1					1	13
				Stretching, strengthening, and endurance exercises alone				1					1	13
				Mobilization as well as massage in combination with other therapies		1			1				1	13
				Manipulation alone	1					1			1	13
				Transcutaneous nerve stimulation							1		1	13
				Thoracic manipulation	1						1		1	13
				Laser							1		1	13
				Traction							1		1	13
			Mechanical neck pain	Thoracic manipulation versus mobilization	1						1		1	94
	12	Motor performance of the deep cervical flexors		Manual therapy targeted to active TrPs in the sternocleidomastoid muscle	1				1				1	5

	13	Neck pain-associated disorders		A multimodal approach including manual therapy, self-management advice, and exercise		1			1				1	16
	14	Whiplash-associated disorders		A multimodal approach including manual therapy, self-management advice, and exercise		1			1				1	16
	15	Chronic mechanical neck pain		A single session of spinal manipulation	1			1	1			Immediate	1	83
				Mobilization	1				1			Immediate	1	83
				Ischemic compression	1					1		Immediate	1	83
				A single session of massage or manual traction	1						1	Immediate	1	83
					1									
	16	Chronic mechanical neck pain not due to whiplash and without arm pain and headaches		Sspinal manipulation or mobilization	1			1	1			6, 12, & to 104 weeks post tx	1	84
	17	Chronic musculoskeletal pain in female breast cancer survivors:		Manual therapy	1				1				1	67
	18	Musculoskeletal thoracic spine and chest wall pain		Spinal manipulation	1					1			1	80
	19	Musculoskeletal pain		Manipulation-induced hypoalgesia	1						1		1	2
	20	A variety of musculoskeletal conditions		Shared Decision-Making			1				1		1	93
	21	Low back pain (LBP)		Maniulation	1				1				1	73
				Mobilization	1				1				1	73
				Deep dry needling techniques						1			1	89
			Acute LBP	Spinal manipulative therapy	1						1		1	74
					1									
			Acute LBP and back-related buttock or thigh pain.	Thrust manipulative procedures	1			1					1	26
			Acute low back pain with related (referred) lower extremity pain	Repeated movements, exercises, or procedures to promote centralization to reduce symptoms				1					1	26

			Acute, subacute, or chronic low back pain with mobility deficits	Repeated movements, exercises, or procedures to promote centralization to reduce symptoms				1					1	26
			Acute–subacute LBP	Manipulation	1			1				Short-term (1–3 m)	1	48
				Manipulation and mobilization combined with UMC		1			1			Short-term	1	48
			Subacute and chronic low back and back-related lower extremity pain	Thrust manipulative and nonthrust mobilization procedures	1			1					1	26
			Subacute and chronic low back and back-related lower extremity pain	Thrust manipulative and nonthrust mobilization procedures	1			1					1	26
			Subacute and chronic low back pain with movement coordination impairments	Trunk coordination, strengthening, and endurance exercises				1					1	26
			Post lumbar microdiscectomy	Trunk coordination, strengthening, and endurance exercises				1					1	26
			Chronic low back pain	Regional manual therapy (RMT) with standard physical therapy		1			1				1	95
				Manipulation	1			1	1			Short time	1	48
				Manipulation + mobilization + UMC		1			1			Short and long-term	1	48
				Mobilization and soft-tissue-techniques + exercise and UMC		1				1		Short and long-term	1	48
				Manipulation + extension exercise		1					1	Short and long-term	1	48
				Movement-based classification (MBC) systems					1				1	72

			Chronic nonspecific low back pain	Spinal manipulative therapy (SMT)	1				1			After 3 weeks	1	6
				Motor control exercise			1		1	1			1	75
			Chronic low back pain with radiating pain	Flexion exercises, combined with other interventions such as manual therapy, strengthening exercises, nerve mobilization procedures, and progressive walking		1				1			1	26
			Subacute and chronic low back pain and radiating pain	Lower-quarter nerve mobilization procedures			1			1			1	26
			Signs of nerve root compression along with peripheralization of symptoms or a positive crossed straight leg raise	Intermittent lumbar traction in the prone position			1			1			1	26
			Acute or subacute, nonradicular low back pain or patients with chronic low back pain	Intermittent or static lumbar traction			1			1			1	26
			Increase the perceived threat or fear associated with low back pain	Education and counseling strategies Should not: (1) promote extended bedrest or (2) provide in-depth, pathoanatomical explanations for the specific cause of the patient's low back pain			1				1		1	26

				Should emphasize (1) the promotion of the understanding of the anatomical/ structural strength inherent in the human spine, (2) the neuroscience that explains pain perception, (3) the overall favorable prognosis of low back pain, (4) the use of active pain coping strategies that decrease fear and catastroph-izing, (5) the early resumption of normal or vocational activities, even when still experi-encing pain, and (6) the importance of improvement in activity levels, not just pain relief			1		1				1	26
			Chronic low back pain without generalized pain	Moderate- to high-intensity exercise			1	1					1	26
			Chronic low back pain with generalized pain	Incorporating progressive, low-intensity, submaximal fitness and endurance activ-ities into the pain management and health promotion strategies			1	1					1	26
			Non-spe-cific low back pain (NSLBP)	Non-thrust manipulation with segmental	1				1				1	39
				Distal dry needling			1		1				1	39
			Acute NSLBP	Motor control exercise			1		1	1			1	75
				Spinal manipulative therapy	1				1	1			1	75
				Other forms of ex-ercise					1	1			1	75
			Acute-sub-acute NSLBP	Manipulation	1			1				Short-term (1–3 m)	1	48
				Manipulation + UMC		1			1			Short-term	1	48
				Manipulation + mo-bilization + exercise/ UMC		1			1			Short-term	1	48
				Manipulation + mo-bilization	1									

			Recurrence NSLBP at one year	Motor control exercise						1			1	75
			Pain and disability in older persons with chronic low back pain	Manual therapy	1					1			1	25
	22	Spine-related painful conditions		Superficial versus deep dry needling or acupuncture			1		1			No differences	1	40
	23	Management of older people with chronic LBP		Manual therapy	1					1			1	2
	24	Pregnancy and related conditions (back pain, other symptoms)		Spinal Manipulative Therapy (SMT)	1					1			1	55
	25	Pregnancy-related back and pelvic pain		Manual therapies	1					1			1	43
	26	Postpartum-related low back, pelvic girdle, or combination pain		Chiropractic care	1					1			1	91
	27	Upper extremity ROM during ULNT		Cervical or thoracic spinal manual therapy	1				1			Increased	1	18
	28	Pain of upper extremity		Cervical or thoracic spinal manual therapy	1				1			Decreased	1	18
	29	Skin conductance of the arm		Cervical or thoracic spinal manual therapy	1				1			Increased	1	18
	30	Skin temperature of the arm		Cervical or thoracic spinal manual therapy	1				1			Decreased	1	18
	31	Childhood respiratory disease		Manual therapy: chiropractic, osteopathic medicine, and massage	1				1				1	66
	32	Shoulder conditions		Manual therapies	1				1				1	45
			Shoulder impingement syndrome (SIS)	Manual therapies	1				1	1			1	45
				Cervicothoracic spinal thrust/non-thrust	1						1		1	92
				Spinal thrust/non-thrust + shoulder manual therapy + exercise intervention		1			1			Pain and function	1	92
			Rotator cuff-associated disorders (RCs)	Manual therapies	1				1	1			1	45
			Adhesive capsulitis (AC)	Manual therapies	1				1	1			1	45

			Nonspecific shoulder pain	Manual therapies	1				1	1			1	45
			Shoulder impingement syndrome (SIS)	Exercise, particularly combined with physical therapy protocols			1		1				1	45
			Adhesive capsulitis (AC)	Exercise, particularly combined with physical therapy protocols			1		1				1	45
			RC	Physical therapy protocols			1		1			Short term	1	45
			Calcific tendinitis RC.	Extracorporeal shockwave therapy			1		1				1	45
			Shoulder impingement syndrome (SIS)	Low-level lase			1		1			Only modality	1	45
			Rotator cuff-associated disorders (RCs)	Low-level lase			1		1			Only modality	1	45
			Adhesive capsulitis (AC)	Low-level lase			1		1			Only modality	1	45
			Nonspecific shoulder pain	Low-level lase			1		1			Only modality	1	45
	33	Shoulder pain and disorders		Manual and manipulative therapy + multimodal or exercise therapy for rotator cuff		1			1				1	10
	34	Non-surgical shoulder conditions		Thrust manipulation	1					1			1	62
	35	Soft tissue injuries of the shoulder												
			Persistent subacromial impingement syndrome	Multimodal care			1			1			1	34
			Subacromial impingement syndrome	Multimodal care			1			1			1	34
			Rotator cuff tendinitis	Dietary-based multimodal care			1		1				1	34

			Nonspecific shoulder pain	Multimodal care vs wait list or usual care by a general practitioner			1		1				1	34
	36	Lateral epicondylopathy		Manipulative and multimodal therapy to specific joints and the full kinetic chain combined generally with exercise		1			1			Short term	1	11
				Manipulation (cervical HVLA)		1			1			Increased pain-free handgrip strength	1	31
	37	Carpal tunnel syndrome		Manipulative and multimodal therapy to specific joints and the full kinetic chain combined generally with exercise		1			1			Short term	1	11
	38	Painful musculoskeletal disorders		Background: Shared Decision-Making (SDM)							1		1	93
	39	Hip osteoarthritis		Manipulative therapy combined with multimodal or exercise therapy		1				1			1	12
	40	Knee osteoarthritis		Manipulative therapy combined with multimodal or exercise therapy		1			1				1	12
	41	Patellofemoral pain syndrome		Manipulative therapy combined with multimodal or exercise therapy		1			1				1	12
				Spinal manipulations	1				1			Medium term.	1	76
	42	Ankle inversion sprain		Manipulative therapy combined with multimodal or exercise therapy		1			1				1	12
	43	Plantar fasciitis		Manipulative therapy combined with multimodal or exercise therapy		1				1			1	12
	44	Metatarsalgia		Manipulative therapy combined with multimodal or exercise therapy		1				1			1	12
	45	Hallux limitus/ rigidus		Manipulative therapy combined with multimodal or exercise therapy		1				1			1	12
	46	Hallux abducto valgus		Manipulative therapy combined with multimodal or exercise therapy		1					1		1	12
	47	Restless legs syndrome (RLS)		Exercises			1		1				1	41
				Acupuncture			1		1				1	41
				Pneumatic compression devices			1		1				1	41
				Near-infrared light			1		1				1	41

				Whole-body cryotherapy			1		1			Short-lasting effects	1	41
				Repetitive transcranial stimulation			1		1			Short-lasting effects	1	41
				Transcutaneous stimulation			1		1			Short-lasting effects	1	41
	48	Chronic ankle instability		Strain counterstrain	1				1			Dynamic ankle stability	1	20
	49	Plantar fasciitis		Manual therapy	1				1				1	51
				Joint and soft tissue mobilization with stretching and strengthening		1			1				1	51
				Manual therapy (MT)	1				1				1	30
				Joint and soft tissue mobilization techniques with stretching and strengthening		1			1				1	30
	50	Myofascial trigger points (MTrPs) in multiple body areas		Dry needling			1		1				1	7
	51	Fibromyalgia		Balneotherapy			1			1			1	81
				Mind-body therapies			1			1			1	81
				Aerobic exercise and cognitive behavioral therapy			1		1				1	77
				Massage	1					1			1	77
				Muscle strength training			1			1			1	77
				Acupuncture			1			1			1	77
				Spa therapy (balneotherapy).			1			1			1	77
	52	Tight hamstrings		Instrument-assisted soft tissue mobilization (IASTM) + proprioceptive neuromuscular facilitation (PNF)	1				1				1	42
	53	Chronic obstructive pulmonary disease (COPD)		Manual therapy	1				1	1			1	46
	54	Chronic obstructive pulmonary disease (COPD)		Spinal manipulative therapy	1				1			Lung function and exercise performance	1	90
	55	Safety of spinal manipulative therapy in children		Spinal manipulative therapy	1					1		Under 10 years	1	22
	56	Musculoskeletal shoulder symptoms:		Thoracic spinal manipulations (high-velocity, low-amplitude thrust manipulations; HVLATMs) and message	1				1				1	71

	57	Primary or early secondary prevention of diseases		Chiropractic treatment	1						1		1	35
	58	Chronic non-cancer pain		Osteopathic manual treatment	1				1				1	70
	59	Hypertension		Manipulation (cervical HVLA)	1				1				1	31
	60	Cost-effectiveness of manual therapy for the management of musculoskeletal conditions		Manual therapy	1				1				1	82
				Subtotal	75	32	38	18	90	43	20	171	159	
Clinical trials														
	61	Cervicogenic headache		Manual therapy targeted to active TrPs in the sternocleidomastoid muscle	1				1				1	5
	62	Prevention and treatment of non-musculoskeletal disorders		Spinal manipulative therapy	1						1		1	24
	63	Non-specific chronic neck pain (NCNP)		Preventive spinal manipulation	1				1				1	58
	64	Tension-type headache		Manual therapy techniques	1				1				1	28
	65	Neck pain, grip force control, and upper extremity muscle activity		Cervical manipulation	1						1		1	8
	66	Photophobia		Manual therapy techniques, applied to the suboccipital region	1					1			1	28
	67	Photophobia		Manual therapy techniques, applied to the suboccipital region	1					1			1	28
	68	Pericranial tenderness.		Manual therapy techniques, applied to the suboccipital region	1					1			1	28
	69	Cervical spine flexion range of motion and pain		Seated thoracic manipulation and targeted supine thoracic manipulation	1				1			Supine may be more effective	1	53
	70	Neck and arm pain with evidence of neural mechanosensitivity:		Soft tissue mobilization versus therapeutic ultrasound	1			1					1	23
	71	Hindfoot fractures		Initiating manual therapy and therapeutic exercises		1			1				1	1
				Subtotal	10	1	0	1	5	3	2		11	
				Total	85	33	38	19	95	46	22	182	170	
				%	54	21	24	10	52	25	12	100		

Table 3: Evidence from 2011 to 2021.

Evidence from 2011 to 2021 in table 3 listed PT programs and levels of evidence for 71 disorders. Table 3 indicated 159 systematic reviews, 11 clinical trials and 170 articles in total. Strong evidence of PT programs was 18 systematic reviews, 1 clinical trial and 19 (10%) articles of manual PT in total. Moderate evidence was 90 systematic reviews, 5 clinical trials and 95 (52%) articles, and 46 manual therapies for 32 disorders in total. Week evidence/unclear evidence was 43 systematic reviews, 3 clinical trials and 46 (26%) articles, and 22 manual therapies of 22 articles for 19 disorders in total. No evidence/no report was 20 systematic reviews, 2 clinical trials and 22 (12%) articles, and 14 manual therapies for 10 disorders in total. These results were summarized in table 4 which indicated two periods of publication and levels of evidence.

Discussion

Comparison of evidence before 2010 and after 2011

Articles of manual PT were cited from PEDro indicated 7 articles of 6 disorders only before 2010; in contrast, these indicated 39 articles of 26 disorders after 2011 (Table 1).

Six disorders (seven articles) were only searched before 2010; in contrast, additional 26 new disorders (39 articles) were searched from 2011 to 2021, and 16 disorders were selected in both period of years (30 articles before 2010 and 45 articles after 2011).

Manual PT has been applied not only neuromusculoskeletal disorders but also has been applied other body systems or disorders, including the respiratory system like asthma and allergy, photophobia, phonophobia, and so on. The results of these searches suggest increasing this trend especially after 2011. However, these trials of manual PT were reported 'poor or unclear evidence' and/or 'no evidence or no research' (Tables 2 & 3). Numbers of article increased after 2011 than before 2010 from 71 to 170 and increasing ratio was 2.4 times (Table 4). Strong evidence of PT programs increased from two (3%) to 19 (10%) and increasing ratio was 9.5 times. Moderate evidence also increased from 35 (48%) to 95 (52%) and increasing ratio was 2.5. In contrast, weak evidence/unclear was from 27 (38%) to 46 (25%) and increasing ratio was 1.7 times, and no evidence/no report was from 7 (10%) to 22 (12%) and increasing ratio was 3.1 times. These result suggest that application of PT programs have been clarified in recent 10 years, and that neuromusculoskeletal disorder or dysfunctions should be evaluated carefully to apply manual or manipulative PT.

Periods of	Numbers of article			Evidence level		
publication (year)	%	(++)	(+)	(+/-)	(-)	Total
Before 2010	71	2	35	27	7	71
	%	3	49	38	10	100
2011~2021	170	19	95	46	22	182
	%	10	52	25	12	100
Increasing ratio	2.4	9.5	2.7	1.7	3.1	2.6

Table 4: Numbers of article and evidence level.

Feature of articles before 2010 (Table 2)

Strong evidence of PT programs for two disorders were aerobic exercise and cognitive behavioral therapy for fibromyalgia syndrome and a course of spinal manipulation or mobilization. First program of PT was not manual PT; therefore, only one article of manual PT was searched, and strong evidence of manual PT was not enough in this period. Moderate evidence was reported 35 (49%) of PT programs for 15 disorders, and 18 (25%) manual PT and 21 articles. These results also indicated that almost half of PT programs were manual PTs and were applied for musculoskeletal disorders. Poor or unclear evidence was reported 18 disorders of 26 PT programs and 27 articles.

These results were manual PTs for fibromyalgia (3 articles), chronic mechanical neck pain (3 articles) and chronic whiplash related neck pain (2 articles) and no musculoskeletal disorders including pediatric health conditions, pregnancy related back and pelvic pain, insomnia. No evidence or no research was reported 7 disorders of 7 PT programs and 7 articles. These were manual PT for infants with kinetic imbalance due to suboccipital strain (KISS) syndrome, chronic mechanical neck pain, low back pain, asthma and allergy, and audible disorders. These results of poor or no evidence were application for chronic conditions and/or non-musculoskeletal disorders.

Feature of articles after 2011

The results indicated that strong evidence was manual PT for chronic mechanical neck pain, acute, subacute and chronic low back pain. Manual PT was so effective for chronic neck pain and any stages of low back pain. Moderate evidence of manual PT showed effective application for many types of musculoskeletal disorders and also no musculoskeletal disorders including Chronic Obstructive Pulmonary Disease (COPD) and hypertension. These researches introduced effects of manual PT for a respiratory disorder and a sympathetic nervous system. Week evidence/unclear evidence was manual PT for many cases of chronic pain and not neuromusuculoskeletal disorders, such as pregnancy-related back and pelvic pain, and postpartum-related low back, pelvic girdle, or combination pain, and photophobia and phonophobia. Chronic pain supposes that many factors affect symptoms. No evidence/no report was related indirect approach of disorders, including thoracic manipulation for acute neck pain, cervicothoracic spinal thrust/non-thrust for shoulder impingement syndrome, and primarily and secondary prevention of disease.

Conclusion

Evidence of manual PT was searched by PEDro and summarized in two periods of year, such as before 2010and after 2011. Before 2010, searched articles were 71 that indicated two strong evidence, 35 moderate evidence, 27 weak evidence/unclear, and 7 no evidence/no report. In contrast, after 2011, searched articles were 170 that indicated 19 strong evidence (increasing ratio: 9.5 times) and 95 moderate evidence (increasing ratio: 2.7 times), 46 weak evidence/unclear (increasing ratio: 1.7 times), and 12 no evidence/no report (increasing ratio: 3.1 times). It is easy to access evidence when we apply manual PT. Manual physical therapists should be continue to increase evidence in the future.

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