

Efficacy of Manual Therapy for the Elderly with Chronic Low Back Pain: A systematic review

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Abstract

Background

Manual therapy (MT) is a well-known physiotherapy approach for low back pain (LBP). Yet, evidence of its effectiveness for elders is hesitant. **Objectives** To determine the effects of MT on pain, physical function, disability, QOL, and psychological aspects among the elderly with chronic LBP. **Methods** Articles between the years 2012-2022 were retrieved using electronic searching. The quality assessment used McMaster Critical Review Form for Quantitative Studies. **Findings** Three articles were reviewed. **Implications** MT effectively improves pain, physical function, disability, QOL, and psychology among the elderly with LBP. Nevertheless, further investigation is needed to gain robust evidence for clinical practice.

Keywords: Low back pain; manual therapy; elderly

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1.0 Introduction

The global incidence of low back pain in 2019 was approximately 568.4 million cases with an age-standardized rate of 6.8%, and the occurrence with an age-standardized rate was 223.5 million cases with 2748.9 annually (Wang et al., 2022). Patel and Kinsella (2017) reported the global prevalence of chronic low back pain is approximately 30%. A recent study reported the prevalence of low back pain among the Korean population aged 60-100 years old is between 25%-37% (Park et al., 2023). In Malaysia, the prevalence of low back pain ranges from 40% to 73%. A previous study has shown that the elderly living in community-dwelling presented with low back pain at 26% prevalence (Zahari et al., 2015), while 62.6% among the elderly living in institutions (Zahari et al., 2016). Now, low back pain affects one-fifth of the population and is presented as the leading cause of disability worldwide which is also associated with socioeconomic loss (Feldman & Nahin, (2022); Hartvigsen et al., (2018)). While chronic low back pain contributes to the second-greatest disability in the world (Tanwar et al., 2022). Low back pain among the elderly is commonly due to degenerative changes in the vertebral column following the aging process (Aung, Lwin, & Balasubramanian, 2023)

Several intervention strategies for low back pain include surgery, drug therapy, and non-pharmacology therapy (Traeger et al., 2022). Even though surgical management for low back pain has shown improvement in terms of pain and function, there is no significant improvement in quality of life (Cruz-Diaz et al., 2015). The issue concerning the elderly with low back pain is their vulnerabilities associated with age. Furthermore, with the current increase in global major health challenges such as adopting healthier life habits, the burden of chronic diseases, comorbidities, as well as mental health issues are all complex and multifactorial that are closely related to the environment which is more serious in the elderly population (Laprise, 2023). Opposite to young patients, the elderly have compromised endogenous pain modulation processing and lower pain thresholds which result in more sensitivity to pain (Dagnino & Campos (2022); Cole et al., (2010)). Thus, this may deteriorate their quality of life and contribute to disability.

Manual therapy is one of the popular physiotherapy techniques for the management of musculoskeletal conditions such as low back pain. It is a passive skill performed by a clinician targeting numerous anatomical structures or systems such as joints, muscles, and other soft tissues (Bishop et al., 2015) to relieve pain and stiffness. The manual therapy techniques for this study refer to joint mobilization or manipulation and massage or soft tissue manipulation. In soft tissue manipulation, a therapist applies mechanical force to transfer the energy to the deep soft tissues. The amount of force used usually depends on the therapist's preference and experience (Chen et al., 2022) It is not known whether the efficiency of massage depends on the force applied. Little is known about the effects of applied pressure on the massage technique in managing low back. This could be due to technical difficulties in measuring the skills. The way of conducting manual therapy techniques is by manipulating factors from a multi-dimensional perspective that impact positive outcomes clinically, which results in pain reduction (Bishop et al., 2015).

The factors include biomedical, neuro-psychosocial, psychological, and non-specific patient factors that link to the technique and process that influence the effectiveness of manual therapy (Bishop et al., 2015). In biomedical, some structural changes within the target tissue could be the findings of measurable movement in targeted tissue during manual therapy. The positive changes in neuro-psychosocial function are observed after performing manual therapy. Additionally, manual therapy is also beneficial for individuals with chronic low back pain that withstand difficulties in the range of motion or lack of adequate mobility and stiffness in certain conditions of musculoskeletal problems (Louw, Nijs & Puentedura, 2017).

Even though many studies on manual therapy demonstrated positive effects on pain and function, they did not include the elderly population (de Luca et al., 2017). This limits evidence to make a definite clinical recommendation of manual therapy for the elderly with low back pain (de Luca et al., 2017). Given the aging population, high-quality review studies are warranted to address this gap. Hence, this study aimed to determine the effectiveness of manual therapy in improving pain, physical function, disability, quality of life, and psychological among elders with chronic low back pain.

2.0 Literature Review

Several modifiable and non-modifiable factors reported to be associated with chronic low back pain among the elderly. However, very limited to limited evidence that females, obesity, anxiety, depression, mental disorders, self-expectation of recovery, self-perceived health status, lifestyles, previous falls or lower body part injury, retirement/disability due to illness, family history of body pain, single or multiple comorbidities, weak abdominal and back muscles, leg pain, leg pain intensity, widespread pain, pain interference on functioning, use of pain medication, occupational exposure (long years of prolong sitting job, repeated bending/twisting), disc space narrowing and severe facet osteoarthritis were significantly related to a higher prevalence of chronic low back pain in older adults (Wong et al., 2022). These factors have greatly influenced the management of chronic low back pain.

People with low back pain are characterized by physical (for example pain, joint, muscle, and function) and psychological (for example fear, kinesiophobia, stress, depression, and anxiety) problems (Hartvigsen et al., 2018). A high fear avoidance belief is often identified in most people with low back pain from their physical activities, work, abnormal symptoms of anxiety, depression, and low levels of somatizing tendency (Zamri, Hoe, & Moy, 2020). A population-based survey has shown a relationship between increased fear-avoidance belief and a higher self-reported disability, poor physical health, and a higher risk of falls in the elderly with low back pain (Sions & Hicks, 2011). In the long term, the avoidance behavior would evolve into disuse, disability, and depression (Larsson et al., 2016), leading to a poor prognosis and prolonged condition (Ishak, Zahari, Justine, 2017).

Low back pain influences the mental health, physical health, and social well-being of an individual. The common reactions to acute lumbosacral or low back pain include despair, anxiety, exhaustion, kinesiophobia, anger, and dread of chronic which can impact pain experience and recovery. Low back pain can disturb the daily life and routine of the person as it causes difficulty for the person to complete daily tasks as the person can feel the pain while doing little for a moment or performing any activity. It will result in limitations of daily tasks, and patients frequently have low self-esteem due to pain and physical presentations. Low back pain hurts people not only physically but also emotionally as it can have a significant impact on life. Untreated or under-treated elderly with low back pain may lead to sleeping disorders, reduced functional ability, falls, malnutrition, emotional distress, impaired cognition, and avoidance of social and recreational activities (Wong, 2017). Coping with pain may face difficulties with increased age due to age-related reduction in physical, sensory, and other functions (Wettstein et al., 2019). However, research has found no association between age and pain intensity in patients with chronic low back pain. The elderly may have reported a better quality of life than younger people as they might anticipate chronic pain better and consider it normal in old age (Wettstein et al., 2019).

The manual therapy technique can reduce pain intensity or severity among adults (Chen et al., 2022) and the elderly with low back pain (Schulz et al., (2019); de Luca et al., (2017)). Various studies have suggested that domain discrimination of the pain experience as changes in sensory resulted in the reduction of pain intensity and discomfort in experiencing pain (Bialosky et al., 2018). Besides, manual therapy also helps to reduce muscle tension and restore mobility of the joints (Arguisuelas et al., 2019) as well as improves physical functions for chronic low back pain among the elderly (de Luca et al., 2017). It can be explained that the pressures from manual therapy techniques cause an increase in local and systemic blood circulation, reduce tension in the muscles, break up the scar tissues, and relieve pain in the soft tissues. When the joint sense or proprioception becomes more sensitive, it will activate better muscle work, thus promoting effective lumbar motion to gain better physical functions (Arguisuelas et al., 2019) such as trunk bending, lifting, walking, and other daily living activities. This indirectly reduces disability in people with low back pain (Arguisuelas et al. (2019); Chen et al. (2021)), especially in the elderly. However, some studies (Balthazard et al. (2012); Chen et al. (2021)) found no significant effect of manual therapy due to the sampling size being too small thus, produces bias or the inappropriate use of clinical outcome measurements.

Manual therapy has been shown to improve the psychological aspect of the elderly with low back pain (Yin et al., 2023). A study by Learman et al. (2013) has found improvement in fear avoidance belief using Fear-Avoidance Beliefs Questionnaire for Work (FABQ-w). However, Balthazard et al. (2012) found no significant improvement in fear avoidance belief measured by Fear-Avoidance Beliefs Questionnaire for Physical Activity (FABQ-pa) among people with low back pain, even though they found improvement in pain and disability. It explained that people with fear-avoidance beliefs can still benefit from manual therapy in improving pain and disability. This finding is consistent with Ishak, Zahari, and Justine

(2017), that found no association between kinesiophobia and pain or muscle function among the elderly with low back pain.

In earlier years, studies have not found that manual therapy has more advantages than the standard treatments for chronic low back pain. However, a recent study found that manual therapy is a useful and practical option for treating pain (Rubinstein et al., 2019). Several studies found that manual therapy benefits patients with low back pain (de Luca et al., 2017). The manual therapy when combined with various types of exercises (such as stretching, strengthening, and mobilizing) was relieving, thus promoting a persistent adherence to the exercise program (Bialosky et al., 2018). Roren et al. (2023) reported that exercise failed to diminish pain compared to the no exercise group in acute and subacute low back pain, while in chronic low back pain, exercise reduced pain at the immediate follow-up compared to no exercise. Exercise also improved function both at the end of treatment and in the long term compared with usual care. Exercise furthermore reduced work disability in the long term. Hence, it is expected that the combination of manual therapy and exercise or physical activity assisted in better outcomes. Nevertheless, the effects of manual therapy among the elderly with chronic low back pain are still debatable and further investigation is great need. Thus, this study explores the effectiveness of manual therapy on pain, physical function, disability, quality of life, and psychological aspects in the elderly with chronic low back pain.

3.0 Methodology

This study is a systematic review with the following PICO (population, intervention, comparison, and outcome measure) inclusion criteria for review. The study population included the elderly aged 60 and above with chronic low back pain. The study intervention must use manual therapy (spinal mobilization or manipulation, massage therapy) that is compared to no intervention or control group or any standard treatment or sham therapy for low back pain. The outcome measures included any assessment for pain, physical function, disability, quality of life, and psychological factors.

Electronic databases MEDLINE (using EBSCO UiTM), PUBMED, Science Direct, and Google Scholar, were searched and studies were collected from 2012 until 2022 (Table 1) using the selected keywords. The main keywords used in the database followed the Boolean operator as follows:-

“Manual therapy” OR “Manipulation” OR “Mobilization” OR “Massage”

AND

“Old People” OR “Old Person” OR “Elderly” OR “Elder” OR “Geriatric” OR “Older Adult” OR “Senior Geriatric”

AND

“Chronic Low Back Pain” OR “Spondylosis” OR “Low Back Pain” OR “Backache” OR “Back Pain” OR “Specific Low Back Pain” OR “Non-Specific Low Back Pain”.

Table 1: Keywords and searching information strategies

Databases	Keywords used
MEDLINE	("manual therapy" OR mobilization OR manipulation OR massage) AND ("old people" OR "old person" OR elderly OR "elder people" OR geriatric OR "older adult" OR "senior geriatric") AND ("chronic low back pain" OR spondylosis OR "low back pain" OR "back pain" OR backache OR "specific low back pain" OR "non-specific low back pain")
PUBMED	((manual therapy) OR (manipulation)) OR (mobilization)) OR (massage) AND (old people) OR (old person)) OR (elderly) OR (elder people)) OR (geriatric) OR (older adult)) OR (senior geriatric) AND (chronic low back pain)) OR (low back pain)) OR (spondylosis) OR (backache)) OR (back pain)) OR (specific low back pain)) OR (non-specific low back pain)
Science Direct	("manual therapy" OR manipulation OR mobilization OR massage) AND ("old people" OR elderly OR geriatric) AND (spondylosis OR "low back pain")
Google Scholar	"manual therapy" OR manipulation OR mobilization OR massage AND "old people" OR "old person" OR elderly OR "elder people" OR geriatric OR "older adult" AND "chronic low back pain" OR spondylosis OR "low back pain" OR "back pain" OR "non-specific low back pain"

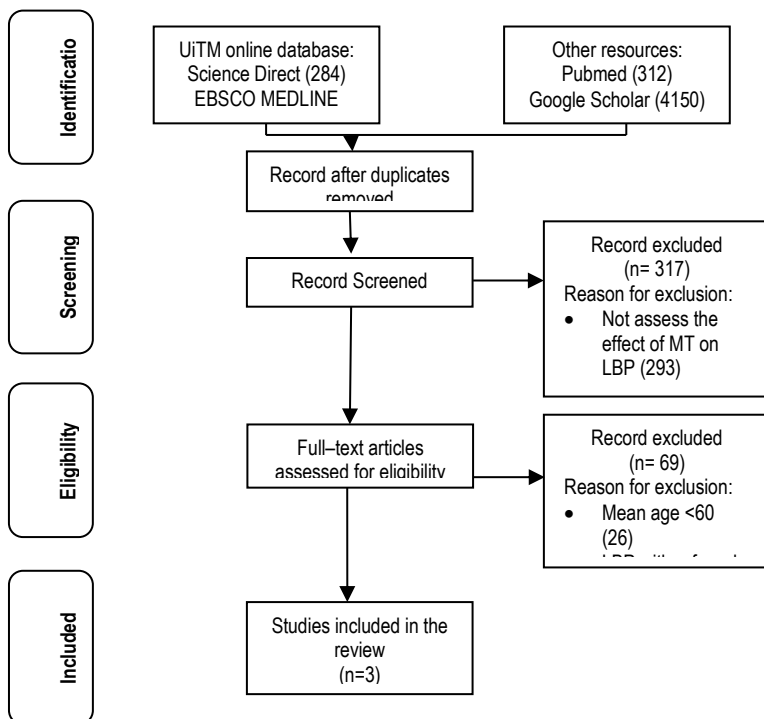


Figure 1: The search strategies for the study using the PRISMA diagram flow

The retrieved articles were rechecked for duplicates and excluded. The title and abstract of the RCT were then reviewed to see if they matched the study. RCT was chosen after a full text of the article was collected and screened using inclusion and exclusion criteria. The chosen RCT was reviewed and the extraction of data on study characteristics (study design, author, and year), population (age, gender, number of participants), the methodology that was used, and the result of the pain, disability, physical function, quality of life, or psychology were then conducted. Later, the extracted data were analyzed. This study follows PRISMA guidelines as shown in the PRISMA diagram flow for search strategies in Figure 1.

The remaining were then reviewed and analyzed following the outcome measure that describes pain, physical function, disability, quality of life, or psychological. The study was excluded when combining the manual therapy with other treatments, including patients with radiculopathy, other commodities, acute low back pain, and a history of surgical intervention.

Studies that met the inclusion criteria were critically appraised by two reviewers (ZZ, AA). This study used McMaster Critical Review Form for Quantitative Studies as an appraisal instrument which consists of 16 questions: study purpose, literature, study design, blinding, sample description, sample size, ethics and consent, the validity and reliability of outcome measures used, intervention description, statistical significance, statistical analysis, conclusion, clinical implication, and study limitation. There were three options for the available answer: yes, no, or not addressed. When the answer is yes, it is marked as 1, no as 0, and not addressed, as no. The total score of this form is 16 points and is classified into five categories which are 0-8= poor, 9-10= good, 13-14= very good, and 15-16= excellent.

4.0 Results

There were 389 RCTs screened after the duplicate articles were removed. There were 317 studies excluded because they were not written in English and did not assess the effects of manual therapy on low back pain. Then, after full-text articles were evaluated, another 69 studies were excluded due to various reasons. Finally, only three studies met the inclusion criteria. The trends of evidence from the reviewed articles are illustrated in Table 2. All three studies demonstrated high-quality evidence with excellent scores (16/16) on the McMaster Critical Review Form for Quantitative Studies.

Table 2: The trends of evidence of reviewed articles

Author	Study Design	Hierarchy level	McMaster Score	Quality	Statistical precision
Dougherty et al. (2013)	RCT	II	16/16	Excellent	CI=95% p>0.05
Learman et al. (2013)	RCT	II	16/16	Excellent	CI=NA p>0.05
Schulz et al. (2019)	RCT	II	16/16	Excellent	CI=95% p<0.05

The result of the data extraction is demonstrated in Table 3.

Table 3: The results of the data extraction

Author	Study design	Number of participants and age	Method	Outcome measures	Result
Learnan et al. (2013)	RCT	<ul style="list-style-type: none"> (age ≥ 55 years) 49 elders (mechanical producible LBP) 	<ul style="list-style-type: none"> 49 subjects received either MT or NMT on at least two occasions are extracted from the large data set. The treatment program consists of a standardized home exercise program for the first two sessions, which could be modified by the therapist after those two sessions. 	<ul style="list-style-type: none"> NPRS ODI FABQ-w 	<p>Statistically significant reductions in pain ($p < .001$) and improvements in disability ($p < .001$) in both MT and NMT across both periods.</p> <p>Improvement of FABQ-w after 2nd visit ($p < 0.05$). Improvement in psychological factors was seen even though the data was only extracted after the second visit ($p < 0.01$).</p>
Dougherty et al. (2014)	RCT	<ul style="list-style-type: none"> (≥ 65 years of age) 136 elders with chronic non-specific LBP divided into two groups 	<ul style="list-style-type: none"> A total of 136 were included in the study, with 69 randomly assigned to SMT and 67 to sham intervention. Patients were treated two times per week for four weeks assessing outcomes at baseline, 5, and 12 weeks postbaseline. 	<ul style="list-style-type: none"> VAS Pain and physical subscale of SF-36 ODI TUG 	<p>Statistically significant reductions in pain (VAS $p < .001$; SF-36 Pain Scale $p < .001$) and improvements in disability ($p < .001$; SF-36 physical function subscale $p < .01$) in both SMT and sham groups from baseline to 12 weeks follow-up</p>
Schulz et al. (2019)	RCT	<ul style="list-style-type: none"> (≥ 65 years of age) 241 elders with sub-acute or chronic LBP divided into three groups 	<ul style="list-style-type: none"> 241 participants received 12 weeks of care in one of three treatment groups: 1) Home Exercise Program (HEP); 2) Supervised Exercise 	<ul style="list-style-type: none"> NPRS Zebris CMS-HS Spine Motion Analyzer TUG Modified MRS 	<p>Statistically significant reductions in pain ($p < .001$) and improvements in disability ($p < .001$; modified RMS and $p < 0.5$; SF-36). Significant improvement is</p>

- (SEP) + HEP, or 3) Spinal Manipulative Therapy (SMT) + HEP.
 - Individuals were asked to refrain from seeking other additional treatment for their back pain during the treatment period.
 - Treatments were provided over 12 weeks and self-report outcomes were collected at 4, 12, 26, and 52 weeks.
- General health subscale of SF-36 seen using objective outcome measures with $p < 0.01$ and improvement in satisfaction and quality of life ($p < 0.01$).

All three studies reported manual therapy improves pain, physical function, and disability among the elderly with low back pain. Only 1 study found manual therapy improved the quality of life and psychological aspects among the elderly with low back pain. Table 4 demonstrates the evidence of the effects of manual therapy among the elderly with low back pain on pain intensity, physical function, disability, quality of life, and psychological aspects. All three studies by Dougherty et al. (2014), Learman et al. (2013), and Schultz et al. (2019) showed that manual therapy improved pain intensity and disability among the elderly with low back pain.

Table 4: Evidence of manual therapy on pain intensity, physical function, disability, QOL, and psychological factors

Author	Effects of Manual Therapy				
	Reduce pain intensity	Increase physical function	Reduce disability	Increase QOL	Improve psychological factors
Learman et al. (2013)	√		√		√
Dougherty et al. (2014)	√	√	√		
Schulz et al. (2019)	√	√	√	√	

5.0 Discussion

The studies by Learman et al. (2013), Dougherty et al. (2014), and Schulz et al. (2019) showed manual therapy improved pain intensity among the elderly with low back pain. The finding is consistent with de Luca et al. (2017), which explained that pain reduction is due

to changes in biomechanical and neurophysiological factors (Bialosky et al., 2018). Various studies have suggested that domain discrimination of the pain experience as changes in sensory resulted in pain intensity reduction and discomfort in experiencing pain which produced positive clinical outcomes (Bialosky et al., 2018). It is explained that the application of touch, pressure, and manipulation inhibit and block the pain impulse to the brain thus interpreting less or no pain and indirectly reducing the level of pain intensity at the affected area. Besides, this also promotes the increase of blood circulation and induces the release of endorphins which lead to soothing, calm, and relaxation effects in the area.

The study by Learman et al. (2013) and Schulz et al. (2019) used Numerical Rating Scale, while Dougherty et al. (2014) used Visual Analogue Scale to measure pain intensity. It showed that both outcome measures were valid for pain intensity evaluation. However, Chen et al. (2020) found manual therapy showed no significant improvement in pain which could be due to numerous factors. The factors include physical impairments, psychological factors, pain exaggeration, symptoms of depression, anxiety, fear-avoidance beliefs about physical activity and work, somatizing tendency, and the environment which were significantly linked with low back pain (Hartvigsen et al., 2018).

Dougherty et al. (2014) and Schulz et al. (2019) also showed manual therapy improved the physical function of the elderly with low back pain. This is consistent with Arguisuelas et al. (2019), and Rubinstein et al. (2019) who found manual therapy improved physical functions in people with low back pain, either by improving joint senses, lumbar motions, or general physical functions. It could be due to the pressures applied to the specific painful region in the body that blocks the pain stimuli and muscle spasms following manual therapy that allows more painless and free motions. Moreover, the mobilization and manipulation techniques would break adhesions in the stiffed joints, thus improving the range of motion in the spines. Manual therapy helps to reduce muscle tension and restore mobility to stiff joints to perform the natural movement of the joints without pain (Arguisuelas et al., 2019). Although Learman et al. (2013) did not measure the effect of manual therapy on physical function, they found a reduction in disability among the elderly with low back pain. However, a recent study (Loss et al., 2020) found manual therapy did not improve physical function, which could be due to the small sample size and time limitation in the studies in which physical functioning needs more time to show improvement.

All three studies showed improvement in disability, but Learman et al. (2013) and Dougherty et al. (2014) used Oswestry Disability Index as an outcome measure and agreed that manual therapy has significantly improved disability among the elderly with low back pain. While Schulz et al. (2019) used the 23-item Modified Roland Scale and found a modest improvement in disability among the participants. Although, with different outcome measures used, manual therapy was still able to show improvement in disability. It explained that when physical function improves, more functional activities such as walking, sitting, driving et cetera can be performed easily and more independently which reduces the disability in the elderly with low back pain. The findings were consistent with Arguisuelas et al. (2019) and Chen et al. (2021), where disability improved due to a decrease in pain

and an elevation of the level of confidence and self-esteem that allows more socialization and improved activities.

Schulz et al. (2019) showed improvement in quality of life among the elderly with low back pain. They used SF-36 as the outcome measure to evaluate the quality of life among the elderly with low back pain. Learman et al. (2013) and Dougherty et al. (2014) did not measure the quality of life in their study, yet both of their studies showed improvement in pain and disability. Mutubuki et al. (2020) have found that an increase in pain and disability leads to decreased quality of life in patients with low back pain. However, Chen et al. (2021) found no evidence to support that manual therapy has improved the quality of life among people with low back pain, where only 2 out of 8 studies measure the quality of life showed a lack of studies investigating the effect of manual therapy on quality of life among the elderly with low back pain. It would suggest more research should be conducted to determine the effect of manual therapy on the quality of life among the elderly with low back pain. A recent study by Aboagye et., al (2022) reported that manual therapy is more cost-effective in improving quality of life than advice to stay active among people with low back pain and neck pain.

Learman et al. (2013) found manual therapy improved fear-avoidance beliefs among the elderly with low back pain. Meanwhile, Dougherty et al. (2014) and Schulz et al. (2019) did not evaluate any psychological aspects in their study. Chen et al. (2021) stated that the improvement seen in function among the elderly with low back pain might be caused by a reduction of fear which allowed them to move better. However, Balthazard et al. (2012) found no significant improvement in fear-avoidance beliefs among people with low back pain, even though they found improvement in pain and disability. It is supported by Ishak, Zahari, and Justine (2017), that found no association between kinesiophobia and intensity of pain and muscle function among the elderly with low back pain. This could be due to the earlier perception that the presence of pain might cause harm or injury. This belief should be omitted among those with chronic pain. Inculcate education on chronic low back pain and thoughtful of the pathophysiology as well as the development of chronic pain might assist in pacing fear (Mosabbir, 2023). Understanding the concept of pain mapping and education is important to overcome fear in the management of chronic pain (Mullins, Hosseini, Gibson & Thake, 2022). It would suggest more research is needed to determine the effect of manual therapy on psychological factors such as fear avoidance beliefs and kinesiophobia, as these factors are closely related and influence the progress of the elderly with chronic low back pain.

This study shows the positive effects of manual therapy on the management of low back pain among the elderly. It provides evidence for healthcare providers, especially physiotherapists on the most appropriate management approach for the elderly with low back pain using manual therapy. It might help to diminish the associated burden on cost, time, and energy to the client, healthcare providers, society, and the country.

However, there are several limitations including a lack of studies investigating manual therapy in the elderly with low back pain than the general population with ages less than 60. Only three studies were eligible for this review. Besides, there are very few studies

evaluating the quality of life and psychological aspects of the elderly with low back pain and the majority were observing pain and disability. Furthermore, some studies included measurements for the same variables, but the outcome measures used were inconsistent which influence the result of this study.

6.0 Conclusion

This study shows a significant improvement in pain intensity and disability following manual therapy among the elderly with low back pain. It also improves physical function, quality of life, and psychological aspects, yet the information is scarce due to a lack of study. Despite the high prevalence of non-specific chronic low back pain among older adults, there is only very limited to limited evidence regarding the effects of manual therapy used to treat this population. Further investigation of the effects of manual therapy on the specific variables in the elderly with chronic low back pain is needed to gain more convincing evidence for clinical practice as the number of the elderly population is mounting and the world is becoming aging.

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Article Contribution to Related Field of Study

Physiotherapy, Manual Therapy, Rehabilitation, Medicine

Authors Declaration

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