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Effectiveness of Manual Therapy on Pain, Disability, and Quality of Life for Elderly with Chronic Low Back Pain

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Abstract
Background Nowadays, manual therapy (MT) is used to treat low back pain (LBP). However, the evidence of its effectiveness is inconclusive. **Objectives** To identify the effect of MT on pain, physical function, disability, QOL, and psychological aspects for the elderly with chronic LBP. **Methods** Electronic searching between the years 2012-2022 was used to retrieve articles. The assessment for quality used McMaster Critical Review Form for Quantitative Studies. **Findings** Only 3 articles met the inclusion criteria. **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 prevalence of LBP worldwide in 2019 was approximately 568.4 million cases with an age-standardized rate of 6.8%, and the incidence with an age-standardized rate was 223.5 million cases with 2748.9 annually (Wang et al., 2022). In Malaysia, the prevalence of low back pain (LBP) is within the range of 40% to 73%. Studies have shown that the community-dwelling elderly presented with LBP at 26% prevalence (Zahari et al., 2015), while 62.6% among the institutionalized elderly (Zahari et al., 2016). Currently, LBP is presented as the foremost cause of disability globally and is also associated with socioeconomic loss (Hartvigsen et al., 2018).

Manual therapy (MT) is a passive and skilled movement that targets various anatomical structures or systems performed by a clinician (Bishop et al., 2015) that is able to relieve LBP effectively both on an immediate basis and for a long-term period. The way of conducting manual therapy techniques is by manipulating factors from a multi-dimensional perspective that impact positive outcomes clinically, which

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results in pain reduction (Bishop et al., 2015). The factors include biomedical, neuro-psychosocial, psychosocial, 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 result of measurable movement in targeted tissue during manual therapy. Positive changes are neuropsychosocial function is observed after manual therapy. According to Louw, Nijs & Puentedura, (2017), manual therapy is beneficial for chronic lower back pain that includes problems in a range of motion and lack of adequate mobility in certain conditions of musculoskeletal problems.

Although studies on MT showed a positive effect on pain and function, it does not include the elderly population (de Luca et al., 2017). These causes limited evidence to make firm clinical recommendations for MT among the elderly with LBP (de Luca et al., 2017). Hence, this study aimed to assess the effectiveness of MT in improving pain, physical function, disability, QOL, and psychological among the elderly with chronic LBP.

2.0 Literature review

Individuals with LBP often are presented with physical and psychological problems (Hartvigsen et al., 2018). A high fear-avoidance belief is identified in most people with LBP 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 FAB and a higher self-reported disability, poor physical health, and a higher risk of falls in the elderly with LBP (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 prolonging the condition (Ishak, Zahari, Justine, 2017).

LBP can impact the mental and physical health and social well-being of an individual. Despair, anxiety, exhaustion, kinesiophobia, anger, and dread of chronic pain are common reactions to acute lumbosacral pain and can impact pain experience and recovery. LBP can disturb the daily life 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 in the daily tasks, and patients frequently have low self-esteem. LBP hurts people not only physically but also emotionally as it can have a significant impact on life. Untreated or under-treated elderly with LBP 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 get difficult with increased age due to age-related reduction in physical, sensory, and other functions (Wettstein et al., 2019). However, research has found that there was no association between age and pain intensity in patients with chronic LBP. The elderly may have reported a better QOL 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 improve pain intensity among the elderly with LBP (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 pain intensity reduction and discomfort in experiencing pain (Bialosky et al., 2018). MT also helps to reduce muscle tension and restore mobility of the joints (Arguisuelas et al., 2019) and improves physical function for chronic LBP among the elderly (de Luca et al., 2017). It explained that the pressures from MT cause an increase in blood circulation, relax muscles, break up the scar tissues and relieve pain in the soft tissues. When the joint sense becomes more sensitive, it will activate better muscle work, thus promoting effective lumbar motion to gain better physical function (Arguisuelas et al., 2019) such as bending, lifting, walking, and other daily living activities. This indirectly reduces disability in people with LBP (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 MT 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 LBP. A study by Learman et al. (2013) has found improvement in fear avoidance belief using FABQ-w. However, Balthazard et al. (2012) found no significant improvement in fear avoidance belief measured by FABQ-pa among people with LBP, even though they found improvement in pain and disability. It explained that people with fear-avoidance beliefs can still benefit from MT 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 LBP.

In the earlier years, studies have not found that MT has more advantages than the standard treatments for chronic LBP. However, a recent study found that MT is a useful and practical option for treating pain. However, a recent study found that MT is a useful and practical option for treating pain (Rubinstein et al., 2019). Several studies found that MT benefits patients with LBP (de Luca et al., 2017). The manual therapy when combined with various types of exercises, was relieving, thus promoting a persistent adherence to the exercise program (Bialosky et al., 2018). Nevertheless, the effects of MT among the elderly with LBP are still debatable and further investigation is in great need. Thus, this study explores the effectiveness of MT on pain, physical function, disability, quality of life, and psychological aspects in the elderly with LBP.

3.0 Methodology

This study is a systematic review with the following PICO (population, intervention, comparison, and outcome measure) criteria for review (Table 1).

Table 1: PICO table review criteria

Element	Description
P	The patient has a mean age of 60 and has chronic low back pain
I	Manual therapy (spinal mobilization or manipulation, massage therapy)

C	No intervention or control group; any standard physiotherapy treatment of chronic LBP or sham therapy
O	Have any outcome measure that measures pain, physical function, disability, QOL, and psychological

Electronic databases MEDLINE (using EBSCO UiTM), PUBMED, Science Direct, and Google Scholar, were searched and study collected from 2012 until 2022. The main keywords used for the search in the databases followed the Boolean operator were: "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".

The retrieved articles were rechecked for duplicates and excluded. The remaining were then reviewed and analyzed following the outcome measure that describes pain, physical function, disability, quality of life, or psychological. The study excluded when combined MT with other treatments, including patients with radiculopathy, other commodities, acute LBP, history of surgical intervention

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. The extracted data were analyzed and reported using PRISMA guidelines as shown in the PRISMA diagram flow for search strategies in Figure 1.

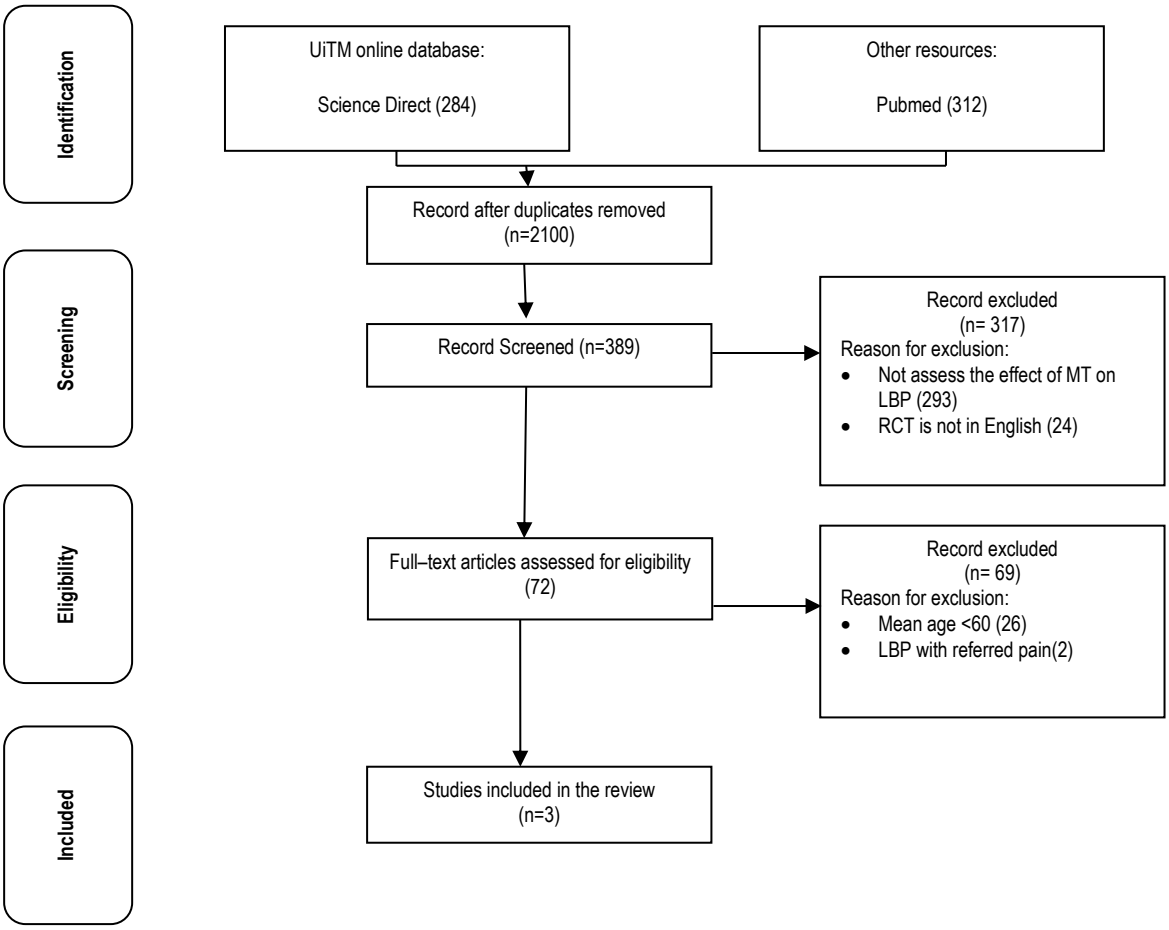

Figure 1: PRISMA diagram flow for search strategies

4.0 Findings

There were 389 RCTs screened after the duplicate articles were removed. There were 317 studies were excluded because they were not written in English and did not assess the effects of MT on LBP. 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 results of the data extraction demonstrate in Table 2.

Table 2: The results of the data extraction

Study	Type of Study	Number of participants and Inclusion age	Method	Outcome measures	Result
Learman et al. (2013)	RCT	• (≥ 55 years of age) • 49 elderly with mechanically producible LBP	• 49 subjects received either an MT or NMT on at least two occasions care and 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.	• NPRS • ODI • FABQ-w	Statistically significant reductions in pain (P< .001) and improvements in disability (P< .001) in both MT and NMT across both periods. 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).
Dougherty et al. (2014)	RCT	• (≥ 65 years of age) • 136 elderly with chronic non-specified LBP divided into two groups	• 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.	• VAS • Pain and physical subscale of SF-36 • ODI • TUG	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
Schulz et al. (2019)	RCT	• (≥ 65 years of age) • 241 elderly with sub-acute or chronic LBP divided into three groups	• 241 participants received 12 weeks of care in one of three treatment groups: 1) Home Exercise Program (HEP); 2) Supervised Exercise (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.	• NPRS • Zebris CMS-HS Spine Motion Analyzer • TUG • Modified MRS • General health subscale of SF-36	Statistically significant reductions in pain (P< .001) and improvements in disability (P< .001; modified RMS and p<0.5; SF-36). Significant improvement is seen using objective outcome measures with p<0.01 and improvement in satisfaction and quality of life (p<0.01).

All three studies reported MT improves pain, physical function, and disability among the elderly with LBP. Only 1 study found MT improved QOL and psychological among the elderly with LBP. All three studies also scored excellent (16/16) on the McMaster Critical Review Form for Quantitative Studies. Table 3 demonstrates the effects of MT among the elderly with LBP on pain intensity, physical function, disability, QOL, and psychological aspects. All three studies by Dougherty et al. (2014), Learman et al. (2013), and Schultz et al. (2019) showed that MT improved pain intensity and disability among the elderly with LBP.

Table 3: The effects of manual therapy on pain intensity, physical function, disability, QOL, and psychological aspects

Study	Effects of Manual Therapy				
	Improve pain intensity	Improve physical function	Improve disability	Improve the QOL	Improve psychological aspects
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 MT improved pain intensity among the elderly with LBP. 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 (Bialoskyet al., 2018). The study by Learman et al. (2013) and Scultz et al. (2019) used NRS, while Dougherty et al. (2014) used VAS to measure pain intensity. It showed that both outcome measures were valid for pain intensity evaluation. However, Chen et al. (2020) found MT showed no significant improvement in pain which could be due to numerous factors. The factors include psychological factors, pain

exaggeration, symptoms of depression, anxiety, fear-avoidance beliefs about physical activity and work, and somatizing tendency, which were significantly linked with LBP (Hartvigsen et al., 2018).

Dougherty et al. (2014) and Schulz et al. (2019) also showed MT improved the physical function of the elderly with LBP. This is consistent with Arguisuelas et al. (2019), and Rubinstein et al. (2019) who found MT improved physical function in people with LBP, either by improving joint sense, lumbar motion, or general physical function. 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 MT that allow 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 MT on physical function, they found a reduction in disability among the elderly with LBP. However, a recent study (Loss et al., 2020) found MT 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 ODI as an outcome measure and agreed that MT has significantly improved disability among the elderly with LBP. 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, MT was still able to show improvement in disability. It explained that when the physical function improves, more functional activities can be performed easily and more independently which reduces the disability in the elderly with LBP. The findings were consistent with Arguisuelas et al. (2019) and Chen et al. (2021), where disability improved due to a decrease in pain and confidence elevation that allows more socialization and improved activities.

Schulz et al. (2019) showed improvement in QOL among the elderly with LBP. They used SF-36 as the outcome measure to evaluate QOL among the elderly with LBP. Learman et al. (2013) and Dougherty et al. (2014) did not measure QOL 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 QOL in patients with LBP. However, Chen et al. (2021) found no evidence to support that MT has improved QOL among people with LBP, where only 2 out of 8 studies measure QOL showed a lack of study investigating the effect of MT on QOL among the elderly with LBP. It would suggest more research should be conducted to determine the effect of MT on QOL among the elderly with LBP.

Learman et al. (2013) found MT improved FAB among the elderly with LBP. 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 LBP might be caused by a reduction of fear which allowed them to move better. However, Balthazard et al. (2012) found no significant improvement in FAB among people with LBP, 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 pain or muscle function among elderly with LBP. It would suggest more research is needed to determine the effect of MT on psychological factors such as FAB and kinesiophobia, as these factors are closely related and influence the progress of the elderly with LBP.

This study shows the positive effects of MT on the management of LBP among the elderly. However, there are several limitations including a lack of study that focused on the elderly with LBP, little investigation on QOL and psychological aspects, and uses of MT for the elderly with LBP. Although the studies included measurements for the same variables, the outcome measures used were inconsistent.

5.1 Implication of the Study

This study provides evidence for healthcare providers, especially physiotherapists on the most appropriate management approach for the elderly with LBP using MT. It might help to diminish the associated burden on cost, time, and energy to the client, healthcare providers, society, and the country.

6.0 Conclusion & Recommendation

Overall, this study shows a significant improvement in pain intensity and disability following MT among the elderly with LBP. It also improves physical function, QOL, and psychological aspects, yet, the information is scarce due to lack of study. Further investigation of the effects of MT in the elderly with LBP is needed to gain more convincing evidence for clinical practice as the number of elderly population is mounting.

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Paper Contribution to Related Field of Study

Physiotherapy, Manual Therapy, Medicine

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