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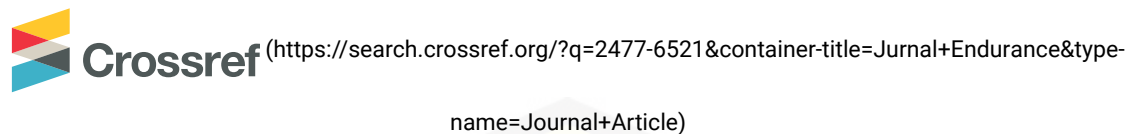


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THE EFFECT OF MC-KENZIE EXERCISE FOR LOW BACK PAIN AT AGRICULTURAL AREAS: A LITERATURE REVIEW

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ABSTRACT

Low back pain is a pain syndrome experienced by individuals caused by poor body position resulting in injury to soft tissue structures which include muscles and ligaments. Low back pain is one of the factors causing morbidity and mortality in agricultural areas. This study's purpose was to review the effect of Mc-Kenzie exercise on patients with low back pain. This study was a literature review. The article search was performed on the google scholar, PUBMED, and SpringerLink electronic databases. There were 264 journal articles found, and seven articles that met inclusion criteria were reviewed. The Mc-Kenzie exercise is the most frequently performed with a duration of training is 20 minutes per session, performed 4 times a week for 4 weeks using movement, relaxing, focusing on the muscles, and for physical or mental relaxation. The Mc-Kenzie exercise can reduce low back pain to muscle rehabilitation safely and without side effects.

Keywords: *Mc-Kenzie exercise, Low back pain, Agricultural*

INTRODUCTION

Indonesia is an agrarian country which most of the people's livelihoods are farmers. Agriculture is one of the most demanding types of work in the environment. Low back pain (LBP) is a common problem in the musculoskeletal system that occurs in agricultural areas (Fibriansari, Maisyaroh, & Widiyanto, 2020). Low back pain is a pain syndrome problem caused by poor positioning (Susanti, Hartiyah, & Kuntowato, 2015). Low back pain was a major cause of living with disability in both developed and developing countries for many years. One of the health and safety

problems at work that is often experienced by farmers (Kanti, Muliani, & Yuliana, 2019). Nerve damage in low back pain can reduce a person's quality of life (Pratiwi, 2020).

The prevalence of low back pain in the world has been reported, with an estimated mortality rate of 10. The incidence rate in Indonesia is around 3.1%, the highest in agricultural areas, more in adults than other groups. Based on cases of occupational diseases in Indonesia, the incidence in East Java in 2010 reached 107.4 million people. Based on prior research on workers, the risk factor for worker posture reaches 15%,

work 18%, and work duration 58% (Marchianti, Sakinah, & Diniyah, 2017).

The causes of low back pain based on risk factors include age, gender, years of employment, smoking habits, and educational history. The relationship between the length of work on the incidence of low back pain is caused by the factor of work duration or the length of work spent by workers with awkward postures in carrying or pushing loads to do repetitive work without rest (Prastuti, Sintia, & Ningsih, 2020). Low back pain is indicated by the presence of pain. Acute pain with complaints of 2-4 weeks and less than 3 months. Meanwhile, this chronic pain experienced intermittent pain for more than 3 months (Navariastami, Koswara, & Ningsih, 2015).

Mc-Kenzie exercise is one kind of intervention to reduce discomfort in low back pain. This exercise is to train the muscles that are felt when the pain in the back hurts. Mc-Kenzie exercise consists of flexion and extension movements to relieve pain, train the back physically, reduce stiffness in sore muscles, and restore elasticity to achieve full comfort for the patient and improve health status (Lam et al., 2018).

With the above explanation, Mc-Kenzie exercise can be used to treat the low back pain to make it easier to deal with pain and easy to perform activity every day. This study's purpose was to review the effectiveness of the Mc-Kenzie exercise in overcoming low back pain.

METHODS

This study was a literature review. A systematic search was used to find the related published literature.

Literature search

The literature search was limited to the 2016-2021 publication years. Articles that were used in this literature review must meet the full-text requirements by using an online search on the PUBMED,

SpringerLink, and Scholar search databases. The search keywords were "Mc-Kenzie exercise" or "low back pain" or "farmer". Keywords may appear in the article title, abstract, or the article keywords themselves. The results of the literature search selection are illustrated in Figure 1.

Inclusion criteria

Articles must be in full-text, use English and Indonesian language, use intervention study design, use the Mc-Kenzie exercise, the adult population with low back pain, and the outcome of the effect of Mc-Kenzie exercise on decreasing pain.

Exclusion criteria

Articles were excluded if the article was in a language other than English and Indonesian with an intervention study that was not Mc-Kenzie exercise, the population of children without low back pain, and outcomes not described the effect of Mc-Kenzie exercise on decreasing pain.

Data extraction and Analysis

Based on the selection of the articles through the database and using keywords that have been adjusted, article screening was carried out through the initial title then abstract screening was carried out to identify which articles have the potential to meet the desired criteria, some articles that did not meet the criteria were removed from the list.

Articles used for literature review were re-examined of all titles and abstracts is carried out to avoid reducing the filtering of articles. The next step was to find articles with full text that had a match between the title and abstract. After that, the selected articles were reviewed. This selection was based on eligibility according to the inclusion and exclusion criteria.

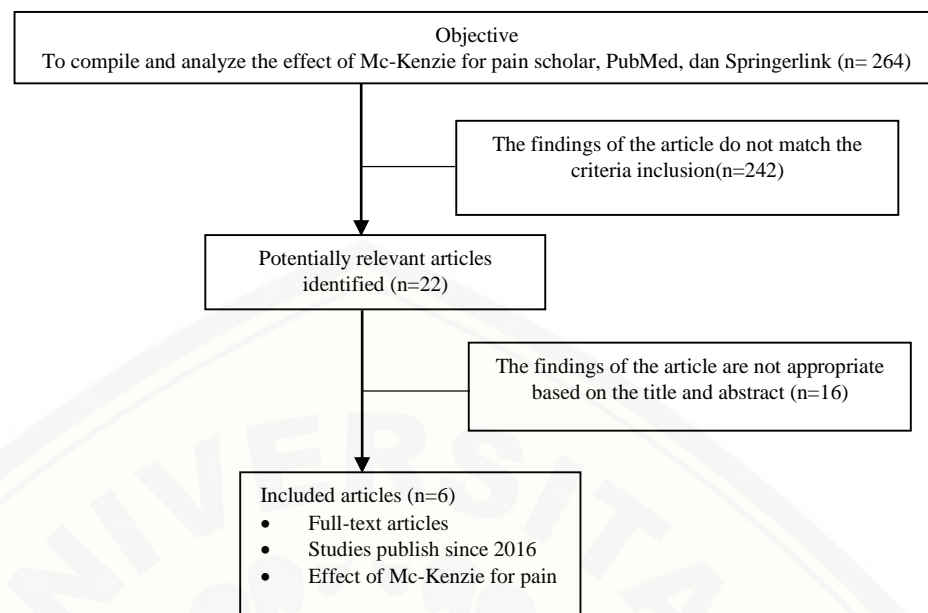


Figure 1. The Flow of literature search

RESULT AND DISCUSSION

RESULT

Articles retrieved

The literature search yielded 264 articles related to keywords. However, after the final selection, 7 relevant articles met

the inclusion criteria to be included in the analysis in the research article. These study results were described in the following tables.

Table 1. Summary Of The Research Methodology And Main Findings

NO	AUTHOR	TITTLE	METHOD	RESPONDENTS	RESULTS
1.	(Lam et al., 2018)	Effectiveness of the McKenzie Method of Mechanical Diagnosis and Therapy for Treating Low Back Pain: Literature Review With Meta-analysis	Randomized controlled trials examining MDT in patients with LBP were identified from 6 databases. 1. Pain: visual analog Scale 2. Pain: numeric rating Scale 3. Back pain and leg Pain 4. LBP rating scale 5. Faces pain scale	patients with either acute (less than 12 weeks in duration) or chronic (greater than 12 weeks in duration) low back pain (LBP).	There was high-quality evidence that MDT was superior to other rehabilitation, pain-reducing interventions and not for patients with acute LBP. (P=0.11) In patients with chronic LBP, there was moderate to high-quality evidence on MDT being superior to other rehabilitations (P=0.03). To treat patients with LBP, MDT can be used, although other intervention methods may offer similar advantages. Statistically, the clinical significance of the effect of MDT needs to be determined because the effect sizes were found to be small to moderate.
2.	(Halliday et al., 2016)	A randomized controlled trial comparing the Mckenzie method to motor control exercises in people with chronic low back pain and a directional preference	This study was a randomized, assessor-blinded, clinical trial with an 8-week follow-up	Participants randomized, n = 70 Participants allocated to the McKenzie method, n = 35. Participants allocated to motor control exercises, n = 35.	There is no statistically significant effect of McKenzie's exercise on increasing muscle strength. The McKenzie method can improve recovery compared to motor control exercises. Effective pain treatment in patients with LBP is not associated with increased muscle strength. In patients with chronic LBP, the McKenzie method produced a

3.	(Kayani et al., 2021)	Effects of McKenzie Method of mechanical diagnosis and therapy on lumbar ROM & pain in patients with Non-specific low back pain	A quasi-experimental trial was conducted from September 2018 to December 2019 on 50 non-specific low back pain patients.	Each subject received 12 sessions, 4 times per week for 3 weeks. The pain was assessed via Numeric Pain Rating Scale & Lumbar Range of Motion via Bubble Inclinometer.	slight improvement that was felt to be better than control motor exercise. There was a statistically significant difference on the numerical pain scale having p-value = 0.01 and lumbar range of motion p <0.05. The McKenzie mechanical method approach can be used for diagnosis and therapy in conjunction with conventional physiotherapy. The result can be reduced back pain intensity along with an increase in lumbar range of motion.
4.	(Sonny Eli Zaluchu, 2021)	Comparison Of Mc Kenzie Approach Versus Lumbar Stabilization Exercises In The Treatment Of Chronic Low Back Pain.	This was a randomized controlled trial. The lottery method was used to randomly divide individuals who fulfilled inclusion criteria into 2 groups. Assessments of the patients were done in OPD.	Samples were taken as many as 30 patients who would become 2 groups that would meet the criteria and each group was divided into 15 patients in the study.	The results of the study were 28 women and 02 men (mean age 50.88 ± 12.29) participated in this study. After 02 weeks of intervention, both treatment groups showed improvement in reducing pain and improving functional status. The lumbar stabilization group showed a significant improvement on the Numeric Pain Rating Scale (p=0.001) and the Modified Oswestry Disability Index (p=0.001) compared to Mc Kenzie.
5.	(Vijayaraj, 2018)	A comparative study between McKenzie technique and neural mobilization in chronic low back pain patients with radiculopathy	Methods: Pre-and Post-experiment Study Design. Subjects were randomly grouped into 2 groups viz. Group A (TENS with traction and McKenzie technique) & Group B (TENS with traction and neural mobilization technique). The outcome measures were visual analog scale (VAS) and disability level in terms of the Modified Oswestry Disability Questionnaire (MODQ).	30 subjects with chronic low back with radiculopathy were recruited from Nandha College of Physiotherapy, Erode, Government Head Quarters Hospital, Erode L.K.M Hospital, Erode. 1. A patient with chronic low back pain with radiculopathy 2. Age 25-60 years 3. Both sexes 4. Centralization phenomenon, determined by using active movements testing has to be presents 5. Symptoms more than 3 months	Intergroup comparisons showed significant results for Pain and MODQ scores and intergroup comparisons showed significant results for Pain MODQ scores, each showing the effectiveness of the McKenzie technique. The results showed that together with TENS + Traction, the McKenzie Technique was significant in reducing pain, improving functional ability, and increasing spinal extension in the chronic low back with radiculopathy.
6.	(Heidar Abady, Rosedale, Chesworth, Rotondi, & Overend, 2017)	Application of the McKenzie system of Mechanical Diagnosis and Therapy (MDT) in patients with shoulder pain; a prospective longitudinal study	This study used a prospective longitudinal design. The Numeric Pain Rating Scale (NPRS) and the Upper Extremity Functional Index (UEFI) were collected at the initial assessment and two and four weeks after treatment commenced.	International, MDT-trained study collaborators recruited 93 patients attending physiotherapy for rehabilitation of a shoulder problem.	The Derangement and Spinal classifications had significantly lower NPRS scores than the Dysfunction group at week 2 and week 4 (p<0.05). The frequency of untrained Derangement and Spinal classifications at week 2 was 37%. The frequency of untrained Derangement and Spinal classifications at week 4 was 15%. Classification of patients with shoulder pain using the MDT system can have an impact on treatment outcomes and the frequency of discharge.

The Technique of Mc-Kenzie Exercise

The finding showed that all articles used the Mc-Kenzie exercise technique with the prone lying technique, where this exercise combines all muscles (Table 1). The finding showed that overall duration that the average duration of the Mc-Kenzie

exercise was 20 minutes per session, performed 4 times in 1 week for 4 weeks. The review result showed that most of the articles used the Numeric Pain Rating Scale (NPRS) instrument to assess the degree of pain in patients with low back pain.

Table 2. The Technique of Mc-Kenzie Exercise

No	Article	Technique	Duration	Instrument
1.	Lam et al., 2018	Mc-Kenzie exercise	2 times per week for 12 weeks	NPRS (scale 2)
2.	Halliday et al., 2016	Mc-Kenzie exercise and control exercise	4 times per week for 8 weeks	NPRS (scale 3)
3.	Kayani et al., 2021	Mc-Kenzie exercise	12 session, 4 times per week for 3 weeks	NPRS (scale 2-3)
4.	Sonny Eli Zaluchu, 2021	Mc-Kenzie exercise, Tens and Traction	8 sessions, 4 times per week for 22 weeks	NPRS (scale 3)
5.	Vijayaraj, 2018	Mc-Kenzie exercise	20 minutes every session, 5 times per week for 4 weeks	NPRS (scale 3)
6.	Heidar Abady et al., 2017	Mc-Kenzie exercise	2 times per week for 4 weeks	NPRS (scale 2)

DISCUSSION

Low back pain often occurs in agricultural people where 30% of adults aged 46-55 years in men 88% and women 13% because of heavy work postures are mostly done by men compared to women. (Sturm & Witte, 2017). While the effect of age on low back pain is related to the aging process with increasing age, including bone degeneration which has an impact on

increasing the risk of low back pain (Segita, 2020). Musculoskeletal complaints are more often reported by people with elementary school education level (34%) because education affects people health knowledge, have a working period of fewer than 10 years (89%), and work positions with the direction of turning the body and holding weight (99%) (Kanti et al., 2019).

Table 3. Effectiveness of Mc-Kenzie Exercise

No	Article	Effectiveness
1.	Lam et al., 2018	Reducing pain and disability in patients with acute LBP (P=0.11). In chronic LBP patients, there was moderate to high-quality evidence on MDT being superior to other rehabilitation (P=0.03)
2.	Halliday et al., 2016	The Mc Kenzie Exercise method improve recovery
3.	Kayani et al., 2021	The result showed back pain reduction intensity along with an increase in lumbar range of motion
4.	Sonny Eli Zaluchu, 2021	Shows pain reduction and improves functional status.
5.	Vijayaraj, 2018	Significant in reducing pain, improving functional ability, and increasing spinal extension in the chronic low back.
6.	Heidar Abady et al., 2017	At 37% the untrained frequency of The Derangement and Spinal classifications at week 4 was 15%. Classification of patients with shoulder pain using the MDT system can have an impact on treatment outcomes and discharge frequency.

The Mc-Kenzie exercise with prone lying technique was often used to treat LBP and combines all the muscles. It has the benefit of reducing pain in low back pain and also relaxing the muscles. Mc-Kenzie exercise was carried out with additional control exercises (Halliday et al., 2016) or additional tension and traction (Vijayaraj, 2018).

Before doing Mc-Kenzie exercise there was 95% of people reported pain, after Mc-Kenzie exercise the pain low back pain was reduced to a range of 7.38 to 9.42. Mc-Kenzie exercise was carried out in an extension that causes pressure at certain points in the vertebral area so that low back pain begins to decrease, the distance between the vertebrae and presses the nucleus disc or pushes it to its original place causing movement of the nucleus (Navariastami et al., 2015).

Mc-Kenzie exercise also involves the back muscles that are incorporated in the back straightening muscle group, muscles that balance the function for balancing the back when standing and lifting something or heavy loads, these muscles include muscle pairs that affect low back pain for Mc-Kenzie exercise (Navariastami et al., 2015).

Exercise can be done 2 times per week for 12 days (Lam et al., 2018). Mc-Kenzie exercise was performed 4 times per week for 8 weeks (Halliday et al., 2016), 12 sessions 4 times a week for 3 weeks (Kayani et al. (2021). Sonny Eli Zaluchu (2021) stated that the training was conducted for 8 sessions 4 times a week for 2 weeks. Another study stated that the Mc-Kenzie exercise application was carried out with 20 minutes each session 5 times a week for 4 weeks (Vijayaraj, 2018), While Heidar Abady et al. (2017) stated exercise conducted 2 times per week for 4 weeks (Heidar Abady et al., 2017).

The instrument used by the articles reviewed were pain scale with an assessment of 0-10 and each value had a description of the pain intensity, namely 0

as no pain and a scale of 10 as very painful (Lam et al., 2018); (Halliday et al., 2016) shows the results of the NPRS scale measurement with a scale value of 2. A scale of 2-3 was found by Kayani (Kayani et al., 2021) and with a scale rating of 3 found by (Halliday et al., 2016), (Sonny Eli Zaluchu, 2021), and (Vijayaraj, 2018).

Mc-Kenzie exercise has four stages of exercise programs, namely (lying on stomach, lying on a pillow, prone on elbows, press-ups) that can be done when low back pain is present. If pain occurs with symptoms of muscle binding pain, numbness, or tingling in any of the four exercise programs, the Mc-Kenzie exercise must be stopped to avoid feeling pain. Low back pain in this factor is also caused by posture stress, obesity, other work positions such as slouching, activity factors, and some activities carried out during work. Muscles that will often be made excessive work activities can feel cramps or pain which will cause musculoskeletal problems in low back pain (Susanti et al., 2015). Mc-Kenzie exercise is done with a period of 1-2 times a day for all the four stages of doing Mc-Kenzie exercise for 5 minutes each stage, this exercise must also be done very relaxed to avoid tense muscles.

This Mc-Kenzie exercise can make the back muscles more trained which leads to pain reduction that is obtained for body balance. The Mc-Kenzie exercise can reduce low back pain, safely muscle rehabilitation, and had no side effects.

CONCLUSION

The most common Mc-Kenzie exercise intervention to reduce low back pain is using the Mc-Kenzie exercise technique in general. The average duration of training is 20 minutes per session, performed 4 times a week for 4 weeks. Mc-Kenzie exercise had a significant effect on reducing low back pain, safely muscle rehabilitation and without side effects.

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