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# EFFECT NON PHARMACOLOGICAL EXERCISE FOR CHRONIC PAIN

**Linda[1], Wina Sophia Ngantung[2], Ferdinand F. Tumewu[3], Albert M. Hutapea[4], Kimberley Maharani Maulibulung Hutapea[5]**
[1,2,3]Universitas Kristen Maranatha, [4]Universitas Advent Indonesia, [5]Universitas Prima Indonesia
amhutapea@unai.edu[4]

## ABSTRACT

Non-pharmacological exercise interventions have been increasingly recognized as an effective and important approach for managing chronic pain. These interventions have been shown to significantly reduce pain intensity, improve physical function, and enhance the overall quality of life in individuals dealing with chronic pain conditions.

Exercise has been shown to be particularly beneficial for individuals with chronic pain, as it can help improve flexibility, strength, and endurance. Additionally, regular physical activity can also promote the release of endorphins, which are natural painkillers produced by the body. It's important to note that the type and intensity of exercise should be tailored to the individual's specific condition and capabilities. Some common non-pharmacological exercise interventions for chronic pain include aerobic exercise, strength training, yoga, tai chi, pilates and aquatic therapy.

A thorough search was conducted in electronic databases for articles published from January 2014 to January 2024. The inclusion criteria involved studies with objective or subjective measures of exercise for chronic pain management. Our review suggests that exercise not only improves physical function but also reduces pain intensity and enhances the overall quality of life for individuals dealing with chronic pain. It is evident from the comprehensive review of 20 studies that exercise has a significantly positive impact on chronic pain management. To increase public health reach and significance, there is an urgent need for a large, well-designed, and more inclusive meta-analysis in this area.

**Keywords :** *chronic, pain,, exercise, effect*

## 1. Introduction

Chronic pain is a prevalent, intricate, and burdensome issue that significantly affects individuals and society. It often arises due to illness or injury; however, it is not just a secondary symptom but an independent condition with its own medical classification. Exploring the prevalence and causes of chronic pain enables us to address the problem at both individual and societal levels. Effective prevention and management approaches should consider the biological, psychological, socio-demographic, and lifestyle factors influencing pain experiences. (Mills et al, 2019)

Chronic pain is a common and debilitating condition that affects millions of individuals worldwide . Persistent pain is defined by prolonged duration, usually exceeding three months. Chronic pain can greatly affect a person's physical and mental health, resulting in reduced overall well-being. and functional impairment. In the past few years, there has been an increasing focus on non-pharmacological approaches to handling chronic pain, due to the constraints and possible negative impacts of pharmacological therapies. (Skelly et al., 2018)

Non-pharmacological interventions for chronic pain encompass a wide range of approaches, including physical therapy, exercise, cognitive-behavioral therapy, acupuncture, and mindfulness-based interventions. The goal of these approaches is to alleviate discomfort, enhance bodily movement, and promote general wellness without the use of medication. This systematic review seeks to investigate the efficacy of physical exercise as a non-pharmacological strategy for managing persistent pain. Specifically, we will examine the impact of various types of exercise such as aerobic exercise which includes activities like walking or swimming that increase heart rate; strength training involving exercises with resistance bands or weights; and flexibility exercises aimed at improving range of motion in joints and muscles. (Polaski et al., 2019)

The report indicated that chronic pain management often relies only on medication and does not incorporate evidence-based non-pharmacological pain treatment modalities (NPMs) (Mafi et al., 2014). These non-pharmacological approaches have been shown to be effective in improving chronic pain outcomes and promoting self-efficacy and active problem-solving in patients . Furthermore, the use of non-pharmacological interventions such as exercise has been shown to have not only physical benefits but also psychological benefits .

There is increasing evidence that using only medication for chronic pain treatment may not

always be safe or effective. Several studies have shown that non-pharmacological methods such as physical therapy, cognitive behavioral therapy, mindfulness-based stress reduction, yoga, and chiropractic treatment can lead to improved outcomes in chronic pain management. While relying solely on medication may result in passive coping mechanisms, non-pharmacological treatments offer benefits through encouraging patient self-efficacy, active problem-solving, realistic goal setting and a functional/rehabilitative approach. (Becker et, al., 2017)

## 2. Methods

In this literature review we use 20 random articles using an internet searching machine, search was conducted in electronic databases for articles published from January 2014 to January 2024. An extensive computer search of the current literature in the PubMed, MEDLINE, and Embase databases was performed using the following keywords: ‘‘chronic pain’’, ‘‘non-pharmacotherapy of chronic pain’’, ‘‘exercise for chronic pain’’ ‘‘alternative and physical therapy’’, or ‘‘interventional pain procedures for chronic pain’’. Articles that were relevant and presented information on the exercise for chronic pain were included. Manual screening of references was conducted, and additional references were added.

## 3. Results

a) Classifications Of Pain

According to the pathophysiological classifications, pain can be categorized as nociceptive, neuropathic, nociplastic, idiopathic, or mixed type. In ICD-11, chronic pain has been included as a separate overarching code with multiple subcodes. One of these subcodes is chronic secondary musculoskeletal pain. There is significant overlap in ICD-11 which allows for diagnoses to fall under multiple parent codes; hence a diagnosis of musculoskeletal chronic pain may fit under both the chronic pain parent code and one of the aforementioned pathophysiological categories. (Treede et al, 2019)

b) Non-pharmacological

Interventions for chronic pain management have gained significant attention in recent years. These treatment methods may be effective in managing both short-term and long-term pain. Muscle spasm often contributes to the experience of pain; applying heat or cold can help reduce this spasmodic muscle contraction, which might stem from direct muscular injury or an underlying neurological or skeletal condition. Passive treatments like hot packs, massage, and ultrasound may be suitable for a brief period, but it is advisable to begin incorporating a home exercise routine, stretching, and self-administered therapies early on. While there is limited

evidence due to the lack of large-scale clinical trials for these approaches, they should still be considered as potential options

When pain subsides, it's important to gradually regain mobilization. However, if muscles remain chronically shortened and contracted, this can lead to ongoing discomfort. In such cases, the best approach is a combination of slow stretching and strengthening exercises. Patients need to learn about a therapeutic exercise routine they can continue at home after their formal therapy ends. This program may include passive movements, active-assistive exercises, active exercises, stretching techniques, and relaxation exercises for optimal results.

Numerous studies have investigated interventions for self-management support in addressing chronic pain. While some comprehensive reviews found no significant effects, one review reported minor improvements in areas such as self-management skills, pain levels, symptoms, and overall functioning. Additionally, physical activity and exercise are increasingly recommended in chronic pain treatments due to their perceived benefits on both physical and mental health as well as physical functioning. Various forms of exercises including aerobic and anaerobic workouts alongside practices like meditation and yoga have shown positive effects on managing chronic pain conditions. Furthermore, walking is suggested as a beneficial physical activity for people experiencing persistent musculoskeletal pain because it is easily accessible and has low impact on the body. (El-Tallawy et al,. 2021)

Exercise is considered a beneficial option to complement drug treatment, but recent research indicates that simply advising patients to exercise may not be effective in bringing about real change. (Geneen et al., 2017) As a result, it is necessary to explore new approaches that can help patients adhere to physical activity-based treatments. The use of modern technologies such as smartphones is becoming increasingly recognized as an effective and practical method for achieving this goal. (Gao & Lee, 2019).

Physiotherapy encompasses various treatment and preventive strategies tailored to address specific issues individuals may be facing.

The main role of physiotherapist are:

a) Give education and advice

A physiotherapist is also capable of providing personalized guidance for integrating self-care practices into your daily routines, aimed at minimizing discomfort and lowering the likelihood of injury. For instance, if you're experiencing back pain, you might receive recommendations

regarding maintaining proper posture, employing safe lifting and carrying methods, and avoiding awkward movements such as twisting or overstretching, as well as prolonged periods of standing.

b) Movement and exercise

Physiotherapist typically advocate for movement and exercise to enhance mobility and functionality. This may involve :

- Specific exercises targeting improvement in strength and movement within particular body areas, typically requiring regular repetition over a defined period.
- Engaging in whole-body activities like walking or swimming, beneficial for individuals recuperating from surgery or injuries impacting mobility.
- Participating in exercises conducted in warm, shallow water, known as hydrotherapy or aquatic therapy, which aids in muscle and joint relaxation and support while facilitating gradual strength development through water resistance.
- Providing guidance and exercises to encourage or sustain physical activity levels, emphasizing the importance of staying active and safe methods to do so.
- Offering advice on the utilization of mobility aids such as crutches or walking sticks for enhanced mobility. Additionally, your physiotherapist may suggest ongoing exercises to assist in long-term pain management or reducing the risk of recurring injuries.

c) Manual therapy

Manual therapy involves the hands-on manipulation, mobilization, and massage of body tissues by a physiotherapist. Its benefits include :

- Alleviating pain and stiffness
- Enhancing blood circulation
- Facilitating more efficient drainage of bodily fluids
- Improving the mobility of various body parts
- Inducing relaxation

While manual therapy is commonly applied to address specific musculoskeletal issues like back pain, it can also be beneficial for a variety of conditions beyond bone, joint, or muscle-

related ailments.

d) Another techniques , such as acupuncture or ultrasound treatmet

Physiotherapists may employ various techniques to alleviate pain and facilitate healing, including:

- Acupuncture: involves the insertion of fine needles into specific body points to reduce pain and aid recovery
- Transcutaneous electrical nerve stimulation (TENS): utilizes a small, battery-operated device to deliver electric currents to the affected area, aiming to alleviate pain.
- Ultrasound therapy: employs high-frequency sound waves to target deep tissue injuries, stimulating blood circulation and cell activity to reduce pain, spasms, and accelerate healing

While some individuals report effectiveness with these treatments, scientific evidence supporting them is limited. Acupuncture has garnered some positive evidence, but the National Institute for Health and Care Excellence (NICE) recommends considering it primarily for chronic pain, chronic tension headaches, and migraines

## 4. Discussion

This journal outlines the historical background and extent of the current issue with pain, covering its individual, social, and economic implications as well as the difficulties in managing pain for patients and healthcare professionals who are implementing prevalent but inadequately supported strategies. It presents the research-based support for non-pharmacological treatments that have been effective in addressing postsurgical pain while reducing opioid usage, acute non-surgical pain, cancer-related pain, and chronic pain. The therapies assessed include acupuncture therapy, massage therapy, osteopathic and chiropractic manipulation techniques, meditative movement therapies sch as Tai Chi and yoga, mind-body behavioral interventions, dietary factors, and self-care/self-efficacy approaches. These non-pharmacological treatments have shown promise in improving pain management outcomes and reducing the reliance on medications.

Transforming the pain care system into a comprehensive and responsive model requires evidence-based treatment options and collaborative care, including effective non-pharmacologic strategies that offer reduced risks of adverse events and addiction. This systematic review reveals the effectiveness of non-pharmacological interventions in addressing chronic pain.

The evidence necessitates taking action to raise awareness about effective non-pharmacologic treatments for pain, educating healthcare professionals and decision-makers on the evidence supporting nonpharmacologic practices, advocating for policy changes that address system and reimbursement obstacles to comprehensive pain care based on evidence, and advancing ongoing research and dissemination of the significance of effective non-pharmacologic treatments in addressing both short-term and long-term therapeutic outcomes as well as economic impact within comprehensive care approaches.

This research adds to the understanding of accessible self-care support for chronic pain, broadening the scope beyond interventions targeting specific conditions or age groups. It explores both peer-led and professional healthcare services in its investigation.

The current research encompassed broad eligibility criteria focusing on chronic pain in a general sense. This is significant as individuals with chronic pain have diverse sources of pain and encounter varying effects of the condition. By including a wide range of participants, those experiencing chronic pain who identified themselves as part of the targeted group and could benefit from the interventions were able to be included. Therefore, an advantage of this study lies in its extensive inclusion criteria directed at addressing chronic pain broadly. The broad range of individuals targeted by the HLC enhances the external validity of the study. However, it may also contribute to a lack of observed effects due to the diverse conditions causing chronic pain, each requiring specific management strategies. This could make it challenging for a generic self-management course to effectively address all potential participant needs.

Creating a customized workout regimen is vital for effectively overseeing persistent pain. A personalized exercise plan should take into account the unique requirements, restrictions, and objectives of the person. It is crucial to seek guidance from a healthcare professional or an accredited exercise expert in order to develop a program that caters to both the physical and mental elements of chronic pain. The workout routine should encompass a mix of cardiovascular exercises, resistance training, stretching routines, and activities focused on mind-body connection like yoga or tai chi.

However, it seems evident that consistent physical activity is advantageous in managing pain. Engaging in physical exercise plays a preventive role in the onset of chronic pain. Research indicates that individuals with an active lifestyle exhibit lower sensitivity to thermal stimuli, suggesting they may experience less pain. Additionally, when a healthy individual engages in short-term intense exercise, there is a temporary period of reduced sensitivity to painful stimuli known as hypoalgesia.

Studies have also observed decreased pain sensitivity in athletes following 120 minutes of aerobic exercise. (Naugle, K.M, 2017)

Eight categories were created to classify the types of physical exercise interventions based on the primary type of activities performed. These categories include aerobic, strength, combined (or multimodal), core-based, McKenzie, Pilates, stretching, and mind-body exercises. Physical exercise might improve pain and physical function in conditions as varied as rheumatoid arthritis, osteoarthritis, patellofemoral pain, fibromyalgia, low back pain, chronic neck pain, intermittent claudication, dysmenorrhea, post-polio syndrome, and spinal cord injury. Additionally, physical activity can improve overall health and well-being, reduce the risk of comorbidities associated with chronic pain conditions, and promote better mental health and quality of life (Geneen, L. J, 2017).

**Incorporating Exercise into Daily Routine for Chronic Pain Management**

Encouraging individuals with chronic pain to incorporate exercise into their daily routine is essential for long-term management. Providing guidance on developing an exercise plan tailored to their specific condition and capabilities, as well as offering ongoing support and motivation, can significantly impact adherence to an exercise regimen.

Importantly, emphasizing the gradual progression of exercises, starting with low-impact activities and gradually increasing intensity, can help prevent flare-ups and injuries, ensuring a safe and sustainable approach to physical activity for individuals with chronic pain. By integrating exercise as a habitual part of their daily lives, individuals can experience the cumulative benefits of improved strength, flexibility, and overall well-being, contributing to better long-term management of chronic pain.

All forms of exercise, except for stretching exercises when modified for intensity and added co-interventions, consistently showed greater effectiveness than minimal functional restrictions in individuals with chronic pain. Pilates exercises were determined to be more effective for reducing pain outcomes compared to other treatments and different types of exercise therapy. In the main analyses, Pilates was found to be more effective in improving functional limitations compared to other comparisons and various forms of exercise therapy.

**Incorporating Different Types of Exercises**

Incorporating a range of different exercises is advantageous for managing chronic pain. Aerobic activities like walking, swimming, or cycling can enhance cardiovascular fitness and overall stamina while stimulating the production of endorphins. Resistance training involving weight lifting

or bodyweight exercises boosts muscle strength and helps maintain joint stability. Flexibility workouts such as yoga or stretching routines assist in preserving or enhancing flexibility and reducing muscle tension.

*Stretching*

Gentle stretching can help increase flexibility and loosen stiff muscles. Stretching can help relieve muscle aches from chronic pain and also serve as a warm-up for more intense exercise. Stretching is essential not only for athletes but for everyone aiming to reduce pain, prevent injury, and maintain flexibility. The main types of stretching include passive (such as static and passive stretching), active (like active stretching and isometric stretching), dynamic stretching, and somatic stretching. Each method offers distinct advantages, from improving flexibility and mobility to enhancing muscle recovery and preventing stiffness.

*Walking*

Walking serves as an excellent form of exercise due to its low impact nature and versatility—it can be performed anywhere, including on a treadmill or simply by standing in place. Moreover, research indicates that walking not only alleviates chronic pain but also enhances blood circulation, leading to increased oxygen delivery to the brain and other bodily tissues. Additionally, it is recognized as an effective cardiovascular activity since it combines weight-bearing elements with gentle movements that contribute to relieving stiffness and discomfort in muscles and joints—particularly in areas such as the core, back, and legs where persistent pain tends to occur.

*Aquatic Exercise*

Aquatic exercise offers minimal impact, making it gentler on the joints. It aids in muscle relaxation and provides buoyancy, particularly beneficial for individuals experiencing musculoskeletal or joint discomfort. Both aquatic aerobics and swimming are viable choices. Swimming, specifically, is effective for enhancing cardiovascular health, endurance, muscular strength, and flexibility, engaging multiple muscle groups including those in the back, shoulders, legs, and core.

*Yoga*

Yoga offers benefits not only for strength but also for flexibility and balance by stretching muscles. Incorporating mindfulness-based meditation practices alongside yoga can aid in acknowledging chronic pain, enhancing body awareness, and managing pain. However, certain yoga poses, particularly those involving the spine and joints, may be too intense for some individuals.

Therefore, it's crucial for beginners to seek guidance from a qualified yoga instructor who can assist in modifying poses or discontinuing exercises if any discomfort arises

*Pilates*

Pilates offers extensive benefits beyond enhancing both mental and physical strength; it can provide significant relief for individuals with spinal injuries or back discomfort. Recent research demonstrates that regular Pilates practice, conducted three times a week over a span of 14 weeks, resulted in enhanced core strength and stability, improved posture and balance, and decreased lower back pain. Another study highlighted that Pilates was more effective in alleviating back pain compared to interventions with minimal physical activity. Similar to yoga, Pilates necessitates proper instruction, emphasizing the importance of finding a skilled and certified instructor to lead your practice.

*Strength Training*

Engaging in weightlifting isn't solely reserved for fitness enthusiasts. Muscle strengthening routines and resistance training pla  a crucial role in managing chronic pain by fortifying the muscles surrounding the joints. Thi helps alleviate joint stress during movement. It's essential to recognize that strength training doesn't necessarily require heavy weights; utilizing your own body weight can yield equally positive results. Collaborating with a physical therapist or personal trainer is key to identifying appropriate exercises tailored to your specific condition and pain levels.

*Biking*

Biking is another gentle form of exercise with minimal impact. Whether you opt for outdoor cycling, biking to run errands, or using a stationary bike at home, you can effectively alleviate chronic pain with this accessible activity. Begin by incorporating shorter intervals rather than prolonged sessions; breaking up your routine into smaller segments offers equivalent health advantages to engaging in a single longer bout of exercise.

*Setting Realistic Goals*

Setting realistic and achievable goals is essential for adherence and progress. It's important to start with manageable activities and gradually increase the intensity and duration as tolerance improves. Breaking down larger goals into smaller milestones can help individuals track their progress and maintain motivation.

*Monitoring and Adjusting the Plan*

Regular monitoring of the exercise plan's effectiveness is critical. This may involve keeping a

pain and activity journal to track improvements, setbacks, or changes in pain levels. Adjustments to the exercise plan can then be made based on the individual's response and feedback to ensure continued progress.

*Integrating Mind-Body Practices*

Integrating mental and physical activities like meditation, controlled breathing, or progressive muscle relaxation alongside regular exercises can enhance the comprehensive approach to managing pain. These practices may aid in stress reduction, better sleep, and improved coping skills, ultimately promoting an individual's overall health and ability to withstand chronic pain.

*Endorphins*

Endorphins, also known as endogenous opioids, are peptides consisting of protein chains. They are primarily regulated and released by the hypothalamus and pituitary gland. Functioning as neurotransmitters, and in some instances considered hormones, they interact with opiate receptors to mitigate pain sensations and induce feelings of pleasure. The term "endorphin" is derived from "endogenous," indicating origin within the body, and "morphine," a potent pain-relieving opiate.

Although the mechanisms of endorphins are not entirely elucidated, they are believed to play a crucial role in modulating our perception of both pain and pleasure. Notably, endorphins are secreted during distressing situations, such as injury, to provide temporary pain relief, as well as during enjoyable activities like consuming chocolate, engaging in sexual activity, or exercising.

The benefits attributed to endorphins are diverse and encompass a range of physiological and psychological effects. These include the alleviation of pain and discomfort, elevation of mood, reduction of stress, depression, and anxiety, dampening of inflammation, enhancement of self-esteem, potential support for immune function, and promotion of memory and cognitive function.

Conversely, insufficient endorphin production may lead to various health issues. These can include heightened perception of aches and pains, elevated risk of mood disorders like depression and anxiety, mood swings, susceptibility to addiction, and disruptions in sleep patterns. Notably, individuals with migraines have been observed to exhibit lower levels of beta-endorphins in their bloodstream, suggesting a potential link between endorphin deficiency and specific health conditions.

However, despite the known effects ofendorphins, research into endorphin deficiency remains limited, necessitating further investigation to better understand its implications for health and well-being

The study, conducted at Harvard Medical School, delved into the connection between exercise and inflammation, aiming to unravel the molecular mechanisms behind the beneficial effects of physical activity. Using mice as models, researchers discovered that exercise-induced muscle inflammation prompts the mobilization of T cells, specifically Tregs (regulatory T cells) which counteract inflammation and enhance muscle function.

The study revealed that Tregs play a crucial role in mitigating exercise-induced inflammation and improving muscle metabolism and endurance. Regular exercise leads to the accumulation of Tregs in muscles, which not only dampens inflammation but also enhances muscle performance over time. Conversely, mice lacking Tregs experienced uncontrolled inflammation and impaired muscle function after exercise.

Further analyses demonstrated that interferon, a pro-inflammatory cytokine, exacerbates muscle inflammation in the absence of Tregs, highlighting its role as a driver of chronic inflammation. Blocking interferon improved muscle function in mice lacking Tregs, suggesting its potential as a therapeutic target for inflammation-related conditions

Overall, the findings shed light on They underscore the importance of Tregs in mediating the anti-inflammatory effects of exercise and suggest that harnessing the body's immune defenses through physical activity could serve as a natural strategy to combat inflammation-related diseases.

Individualized nature of pain experiences and physical capabilities. Tailoring exercise programs to align with specific conditions and preferences can optimize the effectiveness

## 5. Conclusions

The evidence strongly supports the incorporation of non-pharmacological treatments, including exercise therapy, into the management of chronic pain. By recognizing the crucial role of patient education, self-management, and tailored exercise interventions, healthcare providers can empower individuals to actively participate in their pain management, leading to improved physical, psychological, and functional outcomes.

A customized and varied workout schedule is essential in effectively managing long-term pain. By taking into account the specific needs of each person, incorporating different exercise types, establishing achievable targets, tracking progress, and including mind-body techniques, people can see substantial enhancements in pain intensity, physical capability, and overall well-being. It is crucial to collaborate closely with medical professionals and fitness experts to create and follow an exercise program based on reliable evidence that caters to the distinct needs of individuals dealing with chronic

pain.

In conclusion, a holistic and individualized approach to exercise, including a variety of exercises, realistic goal-setting, regular monitoring, and the integration of mind-body practices, is key to effectively managing chronic pain. This comprehensive approach not only addresses the physical aspects of pain but also promotes overall well-being and resilience.

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