Complementary and Alternative Treatment Practices for the Musculoskeletal System in the Elderly

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Abstract

Aging is considered a state of decline characterized by the progression of morphological, physiological, and pathological changes, the convergence of various diseases, and the deterioration of physical and mental abilities. Alongside the changes occurring in the structure, function, and biochemistry of the human body with aging, alterations also emerge in muscles, tendons, and bones. In older adults, muscle mass and strength decrease, and responsiveness to stimuli diminishes. Similarly, bone mass and strength decline, joint surfaces deteriorate, and ligaments, tendons, and joint capsules lose their elasticity, particularly affecting the lumbar spine, hips, and knees that bear the body's weight. A significant portion of the global population experiences musculoskeletal disorders. According to the Global Burden of Disease Study, musculoskeletal disorders rank as the fourth largest contributor to the global burden of disease, accounting for 21.3% of years lived with disability worldwide. Complementary and alternative medicine (CAM) is defined by the National Center for Complementary and Integrative Health (NCCIH) of the U.S. National Institutes of Health as "a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine." CAM modalities used in the treatment of musculoskeletal disorders include: (1) manual therapy methods (massage therapy, osteopathy, chiropractic adjustments, chiropractic care); (2) physical activities and exercises (yoga, tai chi, pilates, hydrotherapy, dance therapy, qigong); (3) biologically-based therapies (nutritional supplements, herbal remedies); and (4) energy-based applications (acupuncture, magnetic therapy, reiki, and therapeutic touch, biofeedback).

Keywords: Aging, Age-related diseases, Musculoskeletal system in aging, Musculoskeletal system disorders, Complementary alternative medicine

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Introduction

Old age is considered as a state of insufficiency where morphological, physiological, and pathological changes progress negatively, various diseases converge, and physical and mental abilities decline. A significant portion of the global population experiences musculoskeletal disorders (Picavet and Hazes, 2003). The Global Burden of Disease Study reports that musculoskeletal disorders represent the fourth largest global health burden and account for 21.3% of years lived with disability worldwide (Hoy et al., 2015). The primary musculoskeletal diseases observed in the elderly include: 1. Metabolic bone diseases (osteoporosis, osteomalacia, Paget's disease), 2. Joint diseases: a. Inflammatory arthropathies (rheumatoid arthritis, gout) b. Non-inflammatory arthropathies (osteoarthritis) (Ebersole et al., 2008; Tablowski, 2006). In parallel with the increase in life expectancy, the rise in chronic, degenerative, and malignant diseases, the high cost of new technologies, the difficulties patients face in accessing these resources, the inability of physicians to dedicate sufficient time to patients, skepticism toward current treatment methods, and fear of potential side effects have significantly increased interest in complementary treatment methods. Furthermore, individuals using complementary treatments believe in their effectiveness (Khorshid and Yapucu, 2005).

Musculoskeletal disorders can lead to negative effects such as pain, limited mobility, and a decrease in overall quality of life. In this context, complementary and alternative therapies play a significant role in helping elderly individuals cope with these issues (Notte et al., 2016). In this process, alternative medicine methods, particularly physical activity and exercise, are frequently used to maintain muscle strength, increase flexibility, and reduce pain in older adults (Çilingir and Bulut, 2017).

1. Aging

According to the World Health Organization (WHO), the components that constitute and influence aging are complex (WHO, 2015). The process of aging and old age consists of three interrelated stages: the biological clock, which encompasses physical changes to the body; the psychological clock, which includes changes in cognitive functions; and the social clock, which pertains to cultural and societal norms, values, and role expectations associated with aging. In this sense, aging is a multidimensional process with chronological, biological, psychological, and

social aspects (Yılmaz, 2011).

1.1. Chronological Aging and Old Age

Chronological aging and old age refer to the assessment of aging based on calendar time, starting from an individual's birth (Altan & Şişman, 2003). Chronological aging classification relies solely on calendar age.

1.2. Biological Aging and Old Age

From a biological perspective, aging and old age encompass the anatomical and physiological changes that occur in the human body over time. These include a decline in organ functions, wear and tear of the organism due to various factors, weakening of the skeletal and muscular systems, loss of movement and motor skills, sensory deficits, and deterioration in the cardiovascular system (Yılmaz, 2011).

1.3. Psychological Aging and Old Age

The aging process can affect individuals both psychologically and cognitively. The cognitive impacts of aging often include negative effects on intelligence, memory, attention, language, visuospatial skills, learning, and cognitive flexibility. Psychologically, it influences factors such as motivation, mood changes, and coping mechanisms (Asi Karakaş & Durmaz, 2017).

1.4. Social Aging and Old Age

The concept of social aging varies depending on the traits that lead to individuals being perceived as elderly by society, the behavioral patterns expected from older adults, and the way elderly individuals position themselves within the community (Samancı Tekin & Kara, 2018).

2. Aging and the Musculoskeletal System

A significant portion of the global population experiences musculoskeletal system disorders (Picavet & Hazes, 2003). According to the Global Burden of Disease Study, musculoskeletal disorders represent the fourth largest contributor to the global burden of disease worldwide, accounting for 21.3% of years lived with disability (Hoy et al., 2015). The three most critical physiological consequences of aging include: -A decrease or loss of compensatory reserves, -A progressive decline in the body’s efficiency to repair damaged tissues, -A reduction in immune responses. These musculoskeletal changes can lead to conditions such as osteoporosis, fractures, bone pain, height reduction, spinal curvature (kyphosis), slower movements, and postural changes (Stephenson, 2003).

3. Complementary and Alternative Therapies Applied to the Musculoskeletal System

Complementary and alternative therapy is defined by the National Center for Complementary and Alternative Medicine at the U.S. National Institutes of Health as “healthcare systems, products, and practices that are part of various fields of medicine and healthcare but are not yet considered a component of modern medicine” (Mutlu, 2019). Alternative treatment is defined as therapies that are performed instead of medical practices and whose effectiveness has not yet been scientifically proven (Yeşil et al., 2018), while complementary alternative therapies are defined as supportive treatments applied to improve quality of life, reduce the side effects of medications, and provide physical and psychological support (Kes et al., 2016). Musculoskeletal disorders can lead to adverse effects such as pain, restricted mobility, and a decline in overall quality of life. In this context, complementary and alternative treatment practices play a significant role in helping elderly individuals cope with these issues (Notte et al., 2016). Among alternative medical approaches, physical activity and exercise are frequently employed to preserve muscle strength, enhance flexibility, and alleviate pain in elderly individuals (Çilingir & Bulut, 2017). Physical exercise and physical activity have a basic preventive and complementary function in the prevention and treatment of such disorders. (Dilekçi & Özkuk, 2020).

3.1. Manual Therapy Methods

Manual therapy is made up of methods that involve the deliberate application of force to the body by manual means for therapeutic purposes (Pettman, 2007). They involve tactile interventions, including joint and soft tissue mobilization and neurodynamic exercises (Damian et al., 2022). There are many theories regarding the mechanisms for the effectiveness of manual therapies. The principal among these are: reduction of spinal herniation and realignment in joint dislocation, alleviation of adhesions within the joint (Cramer et al., 2010), restoration of biomechanical characteristics in soft tissues (George et al., 2006), improvement of central pain modulation (Bialosky et al., 2009), and facilitation of biochemical alterations (Plaza-Manzano et al., 2014).

3.1.1. Massage Therapy

Massage therapy is defined as the manipulation of soft tissue, joints, and the spine using hands or a handheld mechanical device (Brosseau et al., 2012). It involves the systematic manipulation of the body's soft tissues with rhythmic pressure and strokes to prevent, improve, maintain, rehabilitate, enhance physical dysfunction, or alleviate pain (Dryden et al., 2004). Massage styles typically comprise one or more actions, including effleurage (gliding or sliding movements over the skin), petrissage (lifting, squeezing, compressing, pressing, or rolling of soft tissues with kneading movements), friction (penetrative pressure applied with fingertips), tapotement (rapid striking of tissues), and vibration (Netchanok et al., 2012). The specific mechanisms of action of massage therapy are not fully understood; however, it is suggested that the body exhibits various physiological responses to massage therapy. These include an increase in lymphatic flow, a shift from sympathetic to parasympathetic response, prevention of fibrosis, clearance of blood lactate, enhancement of the immune system, and analgesic effects on pain (Dryden et al., 2004; Moyer et al., 2004). Massage reduces pain by inhibiting muscle spindle activity through mechanical and reflex effects or by stimulating large sensory afferent fibers, increasing circulation, and promoting relaxation. In addition to alleviating patients' pain, massage has been found to reduce fatigue, anxiety, nausea, and depression, while improving quality of life and sleep quality (Yaraşır et al., 2018). Additionally, it is suggested to reduce anxiety, depression, and pain through increased levels of serotonin

and endorphins (Moyer et al., 2004).

3.1.2. Osteopathic Manipulative Therapy

Osteopathic manipulative therapy (OMT) is based on the principle that the structure (anatomy) and function (physiology) of the body are closely integrated, and that an individual's well-being depends on the balance among neurological, musculoskeletal, and visceral structures (WHO, 2010). OMT is defined as the therapeutic application of manually directed forces by an osteopathic practitioner to improve physiological function and/or support homeostasis altered by somatic dysfunction (AAC, 2017). OMT encompasses various approaches and techniques, such as myofascial release, mobilization, cranial osteopathy, and visceral manipulation, aimed at optimizing the body's natural self-regulation mechanisms. The primary objective of OMT is to resolve somatic dysfunction (Bagagiolo et al., 2022). OMT is the process of using hands to diagnose illnesses and injuries, followed by mobilizing joints and soft tissues through techniques such as muscle activation, stretching, joint movement, and gentle pressure. This method promotes the body's natural tendency for self-healing (Slattengren et al., 2017). Osteopathy: Osteopathy is applied to correct physiological disorders in organs, particularly in joints, caused by physical or emotional effects on a nerve or nerves. Its purpose is to address movement restrictions, eliminate pain, and resolve functional disorders. While it is often effective in treating lower back and neck conditions, it is also used for other joint issues such as those affecting the shoulders, knees, and hips (Yaraşır et al., 2018). OMT is suitable for patients with nonspecific low back pain originating from the musculoskeletal system. However, it should not be applied in cases of visceral diseases that refer pain to the lower back; vertebral fractures; vertebral joint dislocations; muscle tears or lacerations; ligament ruptures in the spine or vertebral joints; inflammation of intervertebral discs, spinal zygapophyseal facet joints, muscles, or fasciae; skin lacerations; sacroiliitis; ankylosing spondylitis; or low back pain caused by masses located in the lower back structures American Osteopathic Association.: (AOA, 2016).

3.1.3. Chiropractic Therapy

It involves the identification and correction of spinal subluxations (Redwood, 2006). Chiropractic is a healthcare profession that focuses on the diagnosis, treatment, and prevention of neuromusculoskeletal disorders and their effects on health. It involves manual techniques, including the correction and/or manipulation of joint positions, with a specific focus on subluxations (World Health Organization [WHO], 2005). Chiropractic manipulation is a "high-velocity, low-amplitude" thrust maneuver performed on the "specific contact point" of the relevant spinal segment, using a "short lever arm" (Özcan et al., 2020). Modern chiropractic is based on three main hypotheses: Subluxations negatively affect health. There is a functional relationship between the spine and health, mediated by the nervous system. Correcting subluxations through spinal manipulation improves health (Gay et al., 2006).

3.2. Physical Activity and Exercises

Physical activity can prevent age-related losses by increasing muscle mass and bone density (Distefano & Goodpaster, 2018). Regular exercise is an effective method for improving muscle strength and endurance, enhancing joint mobility, and combining flexibility and balance exercises to maintain stability, prevent falls, and facilitate daily living activities (Torlak, 2018). Alternative medicine methods are often combined with physical activities and are commonly used to support pain management and musculoskeletal health in elderly individuals (Kasar et al, 2020).

3.2.1. Yoga

Its original form is described as a complex system comprising spiritual, mental, and physical guidance, with the aim of leading individuals to self-awareness (Saper et al., 2004). It is aimed to achieve physical and mental well-being through the establishment of physical balance using muscular strength. Yoga posture practices (asanas) and breathing techniques (pranayama) began to gain popularity in the Western world during the 1960s (Oken et al., 2006), and their usage has since continued to increase and has been employed in various therapies. This practice has been reported to contribute to reducing stress and anxiety and improving patients' lifespan and quality of life (Lin et al., 2011). The effectiveness of yoga in treating myalgia and osteoarthritis has also been determined (Toprak, 2013). Yoga involves regulated movements, stretching, and breathing exercises intended to strengthen muscles, improve flexibility, and improve balance (Özmen & Contarlı, 2023). Specific types of yoga, such as hatha yoga, specifically intended for older persons, are crucial in preventing the risk of falls (Baklouti et al., 2022). Studies have shown that regular practice of yoga in older adults relieves chronic pain, enhances posture, and enhances physical functioning (Chobe et al., 2020; Kim & Ju, 2017).

3.2.2. Tai Chi

Tai Chi is a Chinese martial art that is performed with slow and controlled movements, and therefore it is an excellent method of enhancing balance and coordination (Chen et al., 2023). Tai Chi has been used in Asia for centuries as a mind-body exercise with the objective of promoting health and preventing disease occurrence. Tai Chi is also commonly used as a form of therapeutic intervention in pain management, arthritis, and mental illness (Wang et al., 2019). Tai Chi exercise among those with chronic low back pain has also been seen to provide a greater decrease in the severity of pain compared to other exercises and running (Weifen et al., 2013). Apart from its analgesic role, Tai Chi is likewise useful in the neuromuscular aspect (Zou et al., 2019). Chen style Tai Chi has also been shown to stimulate the lumbar spine and enhance lower back strength (Liu et al., 2019). It can be regarded as a low-impact activity in terms of the musculoskeletal system but is fall-protective through improved balance and mobility (Özmen & Contarlı, 2023; Rikkonen et al., 2023).

3.2.3. Pilates

Pilates comprises exercises that involve resistance and flexibility, utilizing one's own body weight (Lalarni & Kushartanti, 2019). Pilates is an effective method for strengthening core muscles and improving postural alignment (Teixeira de Carvalho, 2017). Pilates in the elderly

maintains muscle strength by enhancing mobility (Roller, 2018). It has been found to have positive impacts on resistance and balance, improve muscular strength, ameliorate postural deviations, and reduce the risk of falling in the elderly (Donatoni da Silva, 2022). Pilates also has positive impacts on well-being and depression in the elderly, thus showing its contribution to maintaining mental health (Soori et al., 2022). Pilates is a flexibility exercise performed using resistance generated by body weight (Lalarni & Kushartanti, 2019). It is an ideal method particularly used to strengthen muscles and improve posture (Teixeira de Carvalho, 2017). By enhancing mobility in older adults, Pilates helps maintain and increase muscle strength (Roller, 2018). Known for its positive effects on resistance and balance, Pilates has been found to correct postural disorders and reduce the risk of falls in elderly individuals (Donatoni da Silva, 2022). Pilates is successful in addressing urinary incontinence by strengthening the pelvic floor muscles (Dimli et al., 2024).

3.2.4. Hydrotherapy

Hydrotherapy makes it easy and pain-free for elderly individuals to exercise using the buoyancy property of water to minimize the stress on joints (Rivas Neira et al., 2024). Aquatic exercises enhance joint mobility and muscle strength (Avelar et al., 2010). It minimizes pain and enhances physical functioning in osteoarthritis (Alcalde et al., 2017).

3.2.5. Dance Therapy

Dance therapy has positive effects on physical and mental well-being (Borges et al., 2012). It enhances aerobic capacity while at the same time increasing balance and coordination (Gallo et al., 2019). In older adults, dance therapy has been shown to enhance learning and enhancement of motor skills (Sofianidis et al., 2017). It is already sufficiently proven that dance movement therapy is helpful for physical and functional capacity and for the enhancement of muscle strength in elderly people with sarcopenia (Valdés-Badilla et al., 2023). Indeed, in elderly wheelchair users, it has been proved to enhance grip strength and functional upper limb capacity (Wołoszyn et al., 2021). It is also a successful method of fall risk reduction (Franco et al., 2020).

3.2.6. Qigong

Qigong is a complementary medicine method similar to Tai Chi, combining breathing techniques with gentle physical movements. It enhances muscle endurance while regulating energy flow (Feng et al., 2020). Qigong exercise programs are applicable for older adults, with the potential to improve their physical capacity, functional health, balance, psychological well-being, and spiritual wellness. However, although Qigong exercises show positive effects on depression, balance, and functionality in elderly individuals, the overall impacts have not reached statistical significance (Chang et al., 2019).

3. 3. Energy-Based Applications

Bioenergy is one such complementary therapy that incorporates light touch techniques to address muscle tension, relaxation, and psychotherapeutic goals. It is believed to provide significant relaxation rather than directly treating diseases. Additionally, it is thought that releasing trapped emotions and restoring the body and mind to a healthy, balanced, and peaceful state requires first resolving muscle tension and addressing physical imbalances. Bioenergy is a commonly utilized approach for managing stress and pain (Mutlu, 2019).

3.3.1. Acupuncture

It is claimed to have analgesic, sedative, homeostatic, and immune-supportive effects. The effects of acupuncture are thought to arise from the activation of sensory receptors. Another possible mechanism is its neuropharmacological effect. Acupuncture has been shown to stimulate the production of endorphins, serotonin, and acetylcholine within the central nervous system (Yuan et al., 2008). Acupuncture encompasses a group of practices involving the stimulation of specific points on the body using various techniques. Due to its minimal side effects, ease of application, and low cost, acupuncture has become an increasingly preferred treatment method over time (Kawakita et al., 2006). Energy flow is utilized to heal the body and restore disrupted balance. The pathways that facilitate energy flow are referred to as meridians, and the points on these meridians where energy can be influenced are called acupuncture points. Various stimulation techniques are applied to these points, including electrostimulation, manual stimulation, moxibustion, aqua-injection, soft-laser stimulation, acupressure, and magnetic field stimulation. In addition to body acupuncture, there is also ear acupuncture, referred to as "Auriculomedicine." This method involves a series of points on the ear that exert distant effects on the body (Ceyhan & Tasa Yiğit, 2016). A widely used treatment, could be utilized either as a standalone or supportive therapy for conditions such as dental pain, myofascial pain, headaches, back pain, menstrual pain, osteoarthritis, lateral epicondylitis, fibromyalgia, carpal tunnel syndrome, postoperative nausea and vomiting, substance addictions, stroke, and asthma (National Center for Complementary and Integrative Health: (NCC,2015).

3.3.2. Reiki and Therapeutic Touch

Reiki is a Japanese word, where *Rei* means "omnipresent" and *Ki* means "spiritual life energy" (Yücel, 2007). In the Reiki technique, self-treatment can be applied by the patient themselves (Engebretson & Wardell, 2002). Reiki and therapeutic touch are contact-based or non-contact techniques aimed at improving energy flow (Doğan & İster, 2023). Reiki is a practice known as energy therapy and targets the flow of energy within the body (Avci & Gün, 2023). The effects of Reiki on elderly individuals have been shown to be effective in reducing symptoms such as stress, anxiety, and pain. Moreover, it is known that Reiki practices have the potential to be used for improving overall health in elderly individuals (Guo et al., 2024). Therapeutic touch is another method that aims to support healing by establishing interaction with energy fields (Akça et al., 2023). This practice can support both physical and emotional healing (Duman et al., 2024). Its effects on pain have a particularly significant place. Therapeutic touch supports the use of the individual's own healing power and treats the individual as a whole, considering

their bio-psycho-socio-cultural and spiritual dimensions (Sırma & Akın, 2024).

3.3.3. Magnetic Therapy

This method, applied using static or dynamic magnetic fields, can reduce inflammation and alleviate musculoskeletal disorders by improving blood circulation (Xu et al., 2020). Magnetic therapy is a method used to support natural healing processes. This type of therapy is employed for pain management and general health applications in elderly individuals (Kaba, 2020).

3.3.4. Biofeedback

Biofeedback is a technique that helps individuals learn and control their body functions. Biofeedback is a self-regulation technique in which patients learn to voluntarily control involuntary body processes, and it helps patients become aware of the thoughts, emotions, and behaviors related to their physiology (Bergmann et al., 2020). There are two models of biofeedback. 1. The operant conditioning and feedback learning model, uses the results to alter the formation or type of behavior as a tool. 2. The operant conditioning model, relies solely on reinforcing signal displays to enable patients to change their physiology (Van der Zwan et al., 2015). This method is used for stress management and general health practices in elderly individuals (Simón & Bueno, 2017).

Conclusion

Complementary and alternative therapies are frequently used in musculoskeletal disorders common among older adults, primarily to reduce pain, enhance mobility, promote functional recovery, correct impaired body posture, increase muscle and joint strength, and redevelop motor skills. The utilization of complementary and alternative therapies, which are available in various forms globally, as an adjunct to modern medicine, is progressively increasing due to their characteristics of being painless, accessible, and cost-effective. Complementary and alternative treatments for the musculoskeletal system in the elderly provide a significant option for maintaining their health and improving their quality of life.

In conclusion, complementary and alternative therapy applications offer significant potential for addressing musculoskeletal system issues in older adults. However, further research is needed to assess the efficacy and safety of these practices. It is essential for healthcare professionals to be knowledgeable about these applications and to effectively integrate them into care plans for older individuals.

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