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Evaluation the Effect of Physical Activity to Improve Mental and Physical Health

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Knowledgeable

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Lack of activity destroys the good condition of every human being, while movement and methodical physical exercise saves it and preserve it.",

Plato

Abstract

Ancient philosophers and physicians such as Plato and Hippocrates believed in the relationship between physical activity and health, and the lack of physical activity and disease. For nurses, allied health professionals, social workers, physical activity leaders, and sports coaches, Sport and Physical Activity for Mental Health is an evidence-based practical guideline. Exercise is viewed as a useful and effective way to improve and maintain physical and mental health. Adults who move lower their risk of death from all causes, improve their sleep, reduce anxiety and depression in both healthy and psychologically ill people, help them maintain a healthy weight, and can help them decrease pain. Movement helps with mental clarity, as well as concentration and memory. When the body moves, so does our brain, which promotes the production of Brain-Derived Neurotrophic Factor (BDNF), which as we now know, aids cognitive function. Changing posture, breathing, and rhythm can all change the brain, thereby reducing stress, depression, and anxiety, and leading to a feeling of well-being. in addition, exercise can help us to control weight, reduce the risk of chronic diseases, Help the body manage blood sugar and insulin levels, and is useful for quitting smoking, plays a role in preventing the development of mental health problems and in improving the quality of life of people experiencing mental health problems and help keep the thinking, learning, and judgment skills sharp as we age. Physical activity may improve in the treatment of mild to moderate mental disorders. Various public health concerns related to physical activity were investigated in this thesis, which covered a variety of subjects. The aim of this thesis is to investigate the relationship between physical activity to improving physical and mental health in a variety of people.

Methods of physical exercise, variables associated with physical activity, and the relationship between physical activity and various health outcomes have all been investigated as to physical activity methodology, we established the effect of physical activity on the mental health of patients with Alzheimer. we considered the patients up to 60 years with Alzheimer diagnosis in two different countries Iran and Italy. In this study, we conducted the effect of physical activity on lifestyle, life expectancy, and quality of life. In addition, in the Italian language, we investigated the relative validity of two questionnaires used to evaluate the li

festyle and life expectancy of Alzheimer's patients. With regard to determinants of physical activity, we found that the physical activity was associated with improve mental health. we studied a non-randomized clinical trial that associated efficacy of the curves training program for loosing body weight, body circumferences and fat mass percentage. We considered eighty women with age between 30 to 40 years (who train 3/4 times a week) participated over a period of six months. They were allocated into a “Curves” program group and a “High-Intensity Interval Training” group . The results demonstrated “Curves” program improved strength muscles, loss of fat, and fat mass reduction more than High-Intensity Interval Training. Concerning the relationship between physical activity and health outcomes, we performed an umbrella review of systematic reviews and meta-analyses on 9 studies addressing the association between effects of Tai Chi and Qigong on fatigue and quality of life among patients with breast cancer. 3 systematic reviews and meta-analyses reported the effects of Tai Chi and Qigong on cancer-related fatigue among patients with breast cancer. 4 studies reported the effects of Tai Chi and Qigong on quality of life among patients with breast cancer. Whereas 2 studies reported the effects of Tai Chi and Qigong on both cancer-related fatigue and quality of life. According to the results, we found that Tai Chi and Qigong have had potential as supportive therapies in the treatment of cancer-related fatigue and improving the quality of life among patients with breast cancer. However, there is moderate evidence indicating that Tai chi and Qigong reduce fatigue and improve health-related quality of life among patients with breast cancer. Furthermore, we also investigated the connection between the Pilates-based exercise in the reduction of Low Back Pain. In this umbrella review, eleven articles met the inclusion criteria. According to the published literature, there was pain relief and functional improvement from the Pilates-based exercise intervention in the short term in people with chronic low back pain. There was strong evidence that Pilates exercise improved flexibility and dynamic balance and enhanced muscular endurance in healthy people in the short term. Finally, the systematic reviews, we were examined the relationship between tai chi practice and wellness of health care workers in their professional setting. The research was performed in September 2019. In conclusion, this systematic review suggests the potential impact of interventions such as tai chi as tools for reducing work-related stress among healthcare professionals. The research in this thesis emphasizes the large public health potential of physical activity. Physical activity has been widely accepted as a healthy technique to improve individual's mental health. Physical activity has been demonstrated to be just as beneficial as antidepressants

in terms of reducing stress, increasing mood, and promoting self-esteem. According to the results of this thesis, it seems that low to moderate intensity exercise has beneficial effects on lifestyle and quality of life in people with Alzheimer. In additional we found that compared to High-Intensity Interval Training, the "Curves" program enhanced muscular strength, fat loss, and fat mass reduction. The results of the present thesis emphasize mind–body exercise could improve and promote physical health. Tai Chi and Qigong have shown potential as supportive therapies in the treatment of cancer-related fatigue and improving the quality of life among patients with breast cancer and potential impact of tai chi as tools for reducing work-related stress among healthcare professionals. Finally, the findings demonstrate that there was pain relief and functional improvement from the Pilates-based exercise intervention in the short term in people with chronic low back pain.

Chapter 1

INTRODUCTION

Background

Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that requires energy expenditure. Common physical activities consist of exercise, sports, active travel (cycling, walking), household chores and work-related PA(for Europe, 2021). Increased heart rate and perspiration are common during physical exertion. Physical exercise(PE) is a form of regulated, controlled, and previously planned PA that involves repetitive practice with the goal of developing or maintaining physical health(Alves & Alves, 2019). Physical fitness(PF) includes a set of attributes that people have or achieve that relates to the ability to perform PA

PA has a number of benefits for the human body, both in terms of disease prevention and treatment and rehabilitation(Alves & Alves, 2019). PA enhances cognitive development, motor skills, self-esteem, social integration, musculoskeletal health, academic success, and general well-being in children and adolescents. PE helps individuals avoid and control noncommunicable diseases including heart disease, cancer (especially breast and colon cancer), and diabetes, as well as reducing overall mortality and the risk of premature death(for Europe, 2021). In addition, Exercise is a useful technique in a variety of health care general health and wellness. Regular PA is essential for humans' health. According to the stress-buffering hypothesis, PA and exercise are recognized to be stress-relieving habits, since regular PA can help to moderate the harmful effects of stress on health(Wunsch et al., 2021). Physical inactivity and sedentary behavior enrage chronic pain and may contribute to the growth of chronic diseases. Insufficient PE is a primary risk factor for non-communicable disorders and mortality, according to the World Health Organization and the Centers for Disease Control and Prevention(for Europe, 2021),(Ambrose & Golightly, 2015).

Major Categories of Physical Activity

PA has a variety of types of exercise with different intensities include of land-based exercise, aerobic exercise, resistance training, and movement therapies(Ambrose & Golightly, 2015).

Aerobic exercise involves both land-based and aquatic exercises, such as walking and stationary cycling. Chronic pain has long been researched as a therapy with aerobic exercise. Recent research has characterized the advantages of exercise based on its intensity. In the context of chronic musculoskeletal pain, intensity relates to how much energy is wasted rather than joint loading or impact. Low-to moderate-intensity exercise, defined as 50-60 percent of maximum heart rate (maxHR), improves chronic pain symptoms almost universally. Patients with chronic pain who can endure moderate-to-high-intensity activity defined as 60-80 percent of maxHR, a level of intensity necessary to generate cardiovascular fitness increases in the general population, have been demonstrated to improve fitness(Nelson et al., 2007). Free weights, resistance machines, elastic bands, and resistance against water or one's own body weight can all be used for strength training, which is defined as contracting muscles against resistance. Strength training is well-supported for fibromyalgia and chronic pain(Ambrose & Golightly, 2015). Strength training has been shown in recent research to increase quality of life and emotional effects in this population(Sener et al., 2016). Flexibility training involves exercises to increase the joint range of motion and to decrease muscle stiffness. Flexibility exercise alone was shown to be significantly useful in the management of chronic pain, with a stronger influence on emotional affect. Anxiety, despair, and health-related quality of life can all benefit from flexibility exercise(Gavi et al., 2014).

The scientific literature has recently focused on mind–body exercise as a strategy to improve physical and psychological wellness. Breathing and physical exercise, meditation, and other forms of mind–body exercise focus on the mind, body, psychology, and behavior. The quality of movement is emphasized above the amount of movement in this type of exercise(Zou et al., 2019). Tai chi, health qigong, and Indian yoga are examples of mild and slow exercise (low-to-medium intensity aerobic activity), body coordination, and breathing(Liu et al., 2018). It has the benefits of physical and psychological exercise since it emphasizes the trinity of mind, body, and breathing. A growing number of studies have found that mind–body exercise can help with rheumatoid arthritis, cardiovascular disease, primary osteoporosis, musculoskeletal pain, and sleep difficulties,

as well as anxiety, depression, and mental health(Jones et al., 2012). The use of movement therapies such as yoga, Tai Chi, and Qigong to treat chronic pain has gained popularity(C. Wang et al., 2018).

Glossary of terms according to World Health Organization 2020 guidelines(Bull et al., 2020)**.**

Term	Definition
Aerobic physical activity	Activity in which the body's large muscles move in a rhythmic manner for a sustained period of time. Aerobic activity also called endurance activity improves cardiorespiratory fitness. Examples include walking, running, swimming, and bicycling.
Balance training	Static and dynamic exercises are designed to improve an individual's ability to withstand challenges from postural sway or destabilizing stimuli caused by self-motion, the environment, or other objects.
Bone-strengthening activity	Physical activity is primarily designed to increase the strength of specific sites in bones that make up the skeletal system. Bone-strengthening activities produce an impact or tension force on the bones that promotes bone growth and strength. Examples include any type of jumps, running, and lifting weights.
Disability	From the International Classification of Functioning, Disability, and Health, an umbrella term for impairments, activity limitations, and participation restrictions, denoting the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual factors (environmental and personal factors).
Domains of physical activity	Physical activities can be undertaken in various domains, including one of more of the following: leisure, occupation, education, home and/or transport.
Household domain physical activity	Physical activity is undertaken in the home for domestic duties (such as cleaning, caring for children, gardening, etc).
Leisure-domain physical activity	Physical activity performed by an individual that is not required as an essential activity of daily living and is performed at the discretion of the individual. Examples include sports participation, exercise conditioning or training, and recreational activities such as going for a walk, dancing, and gardening.
Light-intensity physical activity (LPA)	On an absolute scale, light intensity refers to physical activity that is performed between 1.5 and 3 METs. On a scale relative to an individual's personal capacity, light-intensity physical activity is usually a 2–4 on a rating scale of perceived exertion scale of 0–10. Examples include slow walking, bathing, or other incidental activities that do not result in a substantial increase in heart rate or breathing rate.
Metabolic equivalent of task (MET)	The metabolic equivalent of task, or simply metabolic equivalent, is a physiological measure expressing the intensity of physical activities. One MET is the energy equivalent expended by an individual while seated at rest, usually expressed as mLO2/kg/min.

Moderate-intensity physical activity (MPA)	On an absolute scale, moderate-intensity refers to the physical activity that is performed between 3 and <6 times the intensity of rest (METs). On a scale relative to an individual's personal capacity, MPA is usually a 5 or 6 on a rating scale of perceived exertion scale of 0–10.
Moderate-to-vigorous intensity physical activity (MVPA)	On an absolute scale, MVPA refers to the physical activity that is performed at >3 METs (ie, >3 times the intensity of rest). On a scale relative to an individual's personal capacity, MPA is usually a 5 or above on a scale of 0–10.
Multicomponent physical activity	Multicomponent physical activities are activities that can be done at home or in a structured group or class setting and combine all types of exercise (aerobic, muscle strengthening, and balance training) into a session, and this has been shown to be effective. An example of a multicomponent physical activity program could include walking (aerobic activity), lifting weights (muscle strengthening), and could incorporate balance training. Examples of balance training can include walking backward or sideways or standing on one foot while doing an upper-body muscle-strengthening activity, such as bicep curls. Dancing also combines aerobic and balance components.
Occupation domain physical activity	See work domain physical activity.
Physical activity (PA)	Any bodily movement produced by skeletal muscles that require energy expenditure.
Physical inactivity	An insufficient physical activity level to meet present physical activity recommendations.
Recreational screen time	Time spent watching screens (television (TV), computer, mobile devices) for purposes other than those related to school or work.
Sedentary screen time	Time spent watching screen-based entertainment while sedentary, either sitting, reclining or lying. Does not include active screen-based games where the physical activity or movement is required.
Sedentary behavior	Any waking behavior characterized by an energy expenditure of 1.5 METs or lower while sitting, reclining or lying. Most desk-based office work, driving a car and watching television are examples of sedentary behaviors; these can also apply to those unable to stand, such as wheelchair users. The guidelines operationalize the definition of sedentary behavior to include self-reported low movement sitting (leisure time, occupational and total), TV viewing or screen time and low levels of movement measured by devices that assess movement or posture.
Transport domain physical activity	Physical activity performed for the purpose of getting to and from places, and refers to walking, cycling and wheeling (ie, the use of non-motorized means of locomotion with wheels, such as scooters, roller-blades, manual wheelchair, etc). In some contexts, the operation of a boat for transport could also be considered transport-related physical activity.

Vigorous-intensity physical activity (VPA)	On an absolute scale, vigorous-intensity refers to physical activity that is performed at 6.0 or more METs. On a scale relative to an individual's personal capacity, VPA is usually a 7 or 8 on a rating scale of perceived exertion scale of 0–10.
Work domain physical activity	Physical activity undertaken during paid or voluntary work.

Physical Activity as Treatment

PA is an effective treatment option for chronic pain that improves pain, sleep, cognitive function, and physical function. According to the evidence, PA has been shown to be beneficial for a variety of chronic conditions, including cardiovascular disease, type 2 diabetes, obesity, and cancer(Bullard et al., 2019). PA improves all aspects of chronic disease that are negatively impacted, such as weight, fatigue, mental health, muscle and bone strength, physical functioning, and quality of life. Furthermore, PA helps to prevent the onset of new chronic diseases, may modify existing diseases, helps in the management of related symptoms, and lowers the incidence of chronic diseases(Thornton et al., 2016). In their systematic study, Gerri, T.-S.J. et al. discovered that cancer patients' self-esteem, fatigue, physical performance, and social functioning all improved significantly(Gerritsen & Vincent, 2016). Similarly, Hu, G. et al. discovered a decrease in mortality attributable to PA in diabetic individuals in their study(G. Hu et al., 2005). The World Health Organization (WHO) declared Coronavirus Disease 2019 (COVID-19) a worldwide pandemic on March 11, 2020. There are now 251 million cases globally, with over 5 million fatalities. Regrettably, these figures are growing by the day. Several nations implemented curfews, domiciliary confinement, or a ban or prohibition on going out or participating in outdoor activities to prevent the virus from spreading. Even if mitigating the immediate damage is a priority, the pandemic's long-term implications are causing tremendous concern(Bhutani & Cooper, 2020). Sedentary behavior and physical inactivity (low levels of PA) were known to decrease the life expectancy of numerous chronic diseases prior to the COVID-19 epidemic. As a result, given that PA levels have declined during the COVID-19 pandemic, it is critical to determine if healthy behaviors have been lowered in persons with chronic conditions as a result of COVID-19 limitations(Fallon, n.d.). The aim of recently systematically review in 2021 related to PA levels before and during the COVID-19 pandemic in people with chronic diseases. The findings of this comprehensive study indicate that the COVID-19 epidemic has harmed those who suffer from chronic diseases. All the investigations revealed a decrease in PA levels during the COVID-19 pandemic compared to pre-pandemic values. During the pandemic, physical activity levels declined significantly, according to the meta-analysis(Pérez-Gisbert et al., 2021). some reviews have also been carried out that provide important recommendations to carry out during confinement. Chevance et al. emphasized the importance of keeping to a regular daily practice and

following WHO recommendations(Chevance et al., 2020). Narici et al. emphasized the need of low- to medium-intensity resistance exercises, exercise regimens, and regular activity, as well as attempting to walk 5000 steps each day(Narici et al., 2021). In additional, during the COVID-19 epidemic, Marçal, I. et al. emphasized the significance of a well-structured PA program (aerobic and/or resistance activity programs) and appropriate nutritional behavior in patients with chronic conditions(Marçal et al., 2020).

Physical Activity for Chronic Disease

Chronic diseases are those that endure for a long time and advance slowly, according to the World Health Organization(Bernell & Howard, 2016). Environmental, behavioral, genetic, and physiological variables all contribute to the development of these symptoms. Chronic diseases, which impact 5–8% of the population in developed countries, are the leading causes of disability and death worldwide(Geleta et al., 2020). Chronic diseases are thought to be responsible for 60 % of global fatalities and 75 % of public health spending. Chronic diseases have changeable and non-modifiable risk factors. The most important modifiable risk factors are tobacco use, a poor diet, and lack of physical activity and avoiding these risk factors is a critical part of treatment(Bachmann et al., 2020). Within the medical community, there is evidence that PA is a successful treatment for chronic conditions(Bullard et al., 2019). Cancer is a main cause of death and a significant impediment to extending life expectancy in every country of the worldwide. According to World Health Organization (WHO) figures, cancer is the primary or second major cause of death before the age of 70 in 112 of 183 nations, and it ranks third or fourth in another 23((WHO) & others, 2020). The rise of cancer as a leading cause of death is partially due to significant reductions in the mortality rates of stroke and coronary heart disease in comparison to cancer in many countries. In 2020, the global incidence rate for all cancer was 19% higher in males (222.0 per 100,000) than in women (186 per 100,000), while rates varied greatly among areas. With an expected 2.3 million new cases in 2020, female breast cancer would have surpassed lung cancer as the main cause of worldwide cancer incidence, accounting for 11.7 percent of all cancer cases. It is the fifth leading cause of cancer mortality worldwide, with 685,000 deaths(Sung et al., 2021). In males, lung cancer is the most common cause of cancer morbidity and mortality. Lung cancer is the second most often diagnosed cancer and the main cause of cancer mortality in 2020, with an expected 2.2 million new cases and 1.8 million fatalities, accounting for around one in every ten (11.4%) cancer diagnoses and one in every five (18.0%) deaths(Sung et al., 2021). Exercise programs and rehabilitation decrease the negative effect of treatment related symptoms and improve function of Individuals living with and after cancer(Stout et al., 2021). Two Category A guidelines, one from Cancer Care Ontario and the other from the American College of Sports Medicine, specify when rehabilitation referrals, assessments, and interventions should be made(Segal et al., 2017). Prior to beginning an exercise prescription, the Cancer Care Ontario guideline proposes completing an

evaluation and making specific recommendations for intervention time, intensity, and duration. Similar recommendations for referral to rehabilitation for exercise therapies across major cancer treatment-related impairments are made by the American College of Sports Medicine(Schmitz et al., 2010). The level of PA is evaluated by the metabolic equivalent task (MET) method ; the MET score is then multiplied by the rate of energy expended during various physical activities, according to the baseline rate of energy expended at rest(Ainsworth et al., 2000). Depending on the study, the criterion for high levels of PA might range from 17.5 MET hours/week (hour/week) to 56 MET hours/week. The results of the recent systematic review in 2021 were demonstrated that high levels of physical exercise (35.5 MET hours/week, approximately 60–75 min/day of moderate-intensity exercise) can help to avoid not just colorectal cancer, but also a variety of chronic conditions and had an improved with a lower mortality rate(Rock et al., 2012)·(Hong & Park, 2021). The reason for this recommendation is that PA was important to cancer patients. Physical exercise lowers insulin resistance, inflammation, myokine production by the musculoskeletal system, and colon transit time, all of which are thought to contribute to a reduction in the carcinogenic process of colorectal cancer and associated comorbidities. In general, several disease-specific guidelines emphasize the importance of maintaining PA levels and engaging in exercise as a recommended component of cancer care, with the majority recommending that cancer survivors aim for 150 minutes of moderate intensity PA per week, as recommended by the American Cancer Society(Rock et al., 2012)·(Arends et al., 2017)·(Felix et al., 2020)·(Stout et al., 2021). In both type 1 and type 2 diabetes, all therapies are beneficial for comorbid depression. New therapies with substantial effect sizes, such as group therapy, internet treatment, and exercise, have been presented in the previous decade(van der Feltz-Cornelis et al., 2021). In additional, PA can help these people improve their cognitive(R. Wang et al., 2021). Increased cardiorespiratory fitness, energy, improved glucose management, lower insulin resistance, improved lipid profile, blood pressure (BP) reduction, and weight loss maintenance are among goals that physical exercise can benefit patients with diabetes achieve(Sigal et al., 2018). High-intensity interval training includes alternating short sessions of higher and lower-intensity exercise. When compared to continuous moderate-intensity exercise, high-intensity interval training leads to larger gains in cardiorespiratory fitness in adults with and without diabetes and improves glycemic management in some trials of patients with type 2 diabetes(Sigal et al., 2018). According to recent research, even light physical activities that break up extended periods of sitting might help diabetic patients'

metabolisms(Dunstan et al., 2011),(Dempsey et al., 2016). As a result, most international and national standards consider physical exercise as a significant non-pharmaceutical therapy for diabetic patients("5. Facilitating Behavior Change and Well-Being to Improve Health Outcomes: Standards of Medical Care in Diabetes-2021.," 2021),(Sigal et al., 2018).

Cardiovascular disease was the major cause of mortality worldwide in 2015, with 17.9 million deaths. According to WHO, recently ranked cardiovascular diseases (CVDs) as the leading cause of death worldwide, defining them as a global concern, given the high percentage of deaths in several countries. PA has been shown to reduce the risk of cardiovascular disorders such ischemic heart disease and stroke(Aune et al., 2021). Exercise is associated with reduced risks of coronary events and mortality(J. Li et al., 2021). Regular physical activity has been shown to help treat and prevent noncommunicable illnesses such as heart disease, stroke, diabetes, and a variety of cancers. It also helps avoid hypertension, maintains a healthy body weight, and improves mental health, quality of life, and well-being, regardless of age(Papa et al., 2021). In the systematic review by Dagfinn Aune et al in 2021 declared that high levels of total PA, leisure-time activity, vigorous activity, occupational activity, walking and bicycling combined and cardiorespiratory fitness are associated with reduced risk of developing heart failure(Aune et al.

2021). Yoga is rising in popularity across the world, and in North America and Europe, it has been modified for use in complementary and alternative medicine. It's an ancient mind-body exercise that consists of three essential elements: posture, breathing, and meditation. Its principle is to achieve body, mind, and spirit integration and balance to improve physical, mental, and spiritual health. Yoga has been shown in several studies to reduce cardiovascular risk factors such as blood pressure (BP), lipid profiles, blood glucose, and anxiety. In the systematic review by Jingen Li et al in 2021 found that yoga significantly improved quality of life in patients with CHD and showed BP, body mass index (BMI) and triglyceride (TG) were also reduced while HDL-C was increased by yoga intervention(J. Li et al., 2021). Clinical practice recommendations for CVD prevention recommend 150 minutes of moderate intensity activity or 60 to 75 minutes of intense exercise each week(Stewart et al., 2017). Similar amounts of frequent moderate or intense exercise have been advised in secondary prevention guidelines for stable CHD. Chronic brain problems are related to a worse quality of life (QoL), a higher incidence of low mood and depression, sensitivity to stress, and cognitive impairment. These consequences are connected, since depressed mood and cognitive impairment are two major variables affecting QoL, whereas depression has a detrimental impact

on cognition(Brissos et al., 2016). Across disorders, exercise treatment has been shown to improve QoL, depression, and cognition. Physical exercise, for example, has been found to improve a wide range of symptoms in stroke patients, to the level that it has been integrated and suggested in guidelines as part of conventional treatment(Winstein et al., 2016). Although several researchers have examined into the effect of physical exercise on various chronic brain disorders such as Alzheimer's disease (AD) (Groot et al., 2016), multiple sclerosis (MS) (Demaneuf et al., 2019), Parkinson's disease (PD) (Fayyaz et al., 2018), schizophrenia (Sz) (Dauwan et al., 2016), and unipolar depression (UD) (Brondino et al., 2017) the results and, more importantly, clinical practice recommendations have been extremely varied. In the recent review in 2021 considerate One hundred and twenty-two studies, including 7231 patients and demonstrated that exercise is an effective and safe add-on treatment intervention in individuals with chronic brain diseases, with a medium effect on QoL and a high effect on mood and a good dose–response connection. Exercise has a minor but significant effect on various cognitive areas(Dauwan et al., 2021).

Physical Activity on Cognitive Intervention in Older Adults With Mild Cognitive Impairment

Mild cognitive impairment (MCI) is a common stage in the aging process that precedes the onset of dementia. Mild cognitive impairment is a term used to describe a set of cognitive impairment disorders that appear in the early stages of dementia. According to recent research including persons over 60 years old, the incidence of MCI is around 15% (Xue et al., 2018), whereas another cohort study in Beijing, China found a frequency of 16.6(Hao et al., 2017) percent among older adults. Furthermore, conversion rates from MCI to dementia and Alzheimer's disease (AD) have been found to be 34 and 28 percent, respectively, in domestic research(C. Hu et al., 2017). There are around 50 million people living with dementia worldwide. Approximately 10 million incident diagnoses are made each year, with current projections estimating that 132 million people worldwide will have dementia by 2050(*Global Action Plan on the Public Health Response to Dementia 2017 - 2025*, 2017). Most of the dementia care is provided by informal caregivers, primarily family but also friends, and is estimated to account for 40% of the overall cost of dementia globally(*Global Action Plan on the Public Health Response to Dementia 2017 - 2025*, 2017). In the review by Henrik et al in 2021 assessment psychosocial interventions to support the mental health of informal caregivers of persons living with dementia. They said that intervention programs might be effective in improving the mental health of informal careers of dementia patients. In conclusion, cognitive behavioral techniques show promise, particularly in terms of reducing depressed symptoms. Aside from that, leisure, and PA interventions, as well as, to a lesser extent, psychoeducational techniques, appear to help reduce subjective caregiver load(Wiegelmann et al., 2021). The results of a systematic review and meta-analysis by Liming Yong and colleagues in 2021 provide positive evidence that aerobic exercise significantly improves cognitive performance in older adults with MCI. in addition, none of the included studies reported adverse events related to aerobic exercise(Yong et al., 2021). In another systematic review declared that addition to general health and wellness, Exercise is an effective strategy in a variety of health-care situations. Exercise is utilized in a variety of rehabilitative settings to increase general functional capacity or to target skeletal muscle function and an effective cognitive enhancement intervention for older adults with cognitive impairments(Stout et al., 2021).

Physical Activity and Depression

Anxiety is a psychiatric symptom that is defined by the presence of apprehensive expectancy or fear in humans. It is one of the most common mental symptoms worldwide. Anxiety and depression disorders are defined as mental and behavioral disorders, especially neurotic disorders, in the tenth edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), developed by the WHO(Remes et al., 2016). In recent years, a significant body of evidence has arisen, indicating that physiological and psychological health problems are a serious concern among higher education students. According to Stewart-Brown and colleagues, one-third of university students have at least one long-term illness(Stewart-Brown et al., 2000). Recent investigations have indicated a comparable number of students suffering from mental health concerns, demonstrating that student life may be a source of distress, since students report greater levels of distress than their non-student peers, and high levels of stress have an influence on life quality(Pereira et al., 2019). Individuals who participate in PA have a decreased chance of getting anxiety disorders than those who do not. In the first systematic review with meta-analysis aimed at identifying if PE programs can be a good method to reduce anxiety symptoms in individuals with disabilities. The results are shown in this systematic review with a meta-analysis, PE is a good method for reducing anxiety symptoms in individuals with disabilities, as well as a good method to promote their quality of life(Jacinto et al., 2021).

Physical Activity on Children's Growth

One of the most important health indicators in childhood and adolescence is growth, which is defined as a rise in body size as measured by weight and height increases. Humans are most vulnerable bio-psychosocially throughout their growth phase(Grantz et al., 2018). Overweight and obesity are exacerbated by physical inactivity, particularly among young individuals from low socioeconomic backgrounds(Hao et al., 2017). Participating in PA on a regular basis has a good influence on health and fitness, particularly in children and adolescents. Meanwhile, children and adolescents who do not get enough PA are more likely to smoke, watch too much television, and eat poorly. Developing this pattern of behaviors during childhood and adolescence increases the

chance of these tendencies persisting into adulthood and resulting in declining health(L. Li & Moosbrugger, 2021). PA is healthy for children and teenagers, and it appears to impact the growth of various tissues, such as muscle, bone, and fat tissue, throughout their lives and reduce the risk of osteoporosis and fractures throughout life(Alves & Alves, 2019). Over the last four decades, the relationship between PA and mental health in normally developing children has been intensively researched. In normally developing children, evidence demonstrated that regular PA engagement is favorably connected with self-perception, self-efficacy, self-esteem, and confidence. Neurobiological, psychological, and behavioral factors might explain the favorable benefits of PA on children's mental health(Yang et al., 2021). Expert suggestions, rather than conclusive scientific data, are used to advocate that children and adolescents should engage in at least 60 minutes of moderate-to-vigorous level physical exercise each day(Tudor-Locke et al., 2011). Furthermore, sedentary behavior should be confined to no more than 2 hours every day, according to guidelines. Adults should engage in at least 30 minutes of moderate-to-vigorous level physical exercise every day, according to the guidelines(Tremblay, Leblanc, et al., 2011).

Physical Activity and Improvement of Mental Health

Over a third of the world's population suffers from or will suffer from a mental disorder at some time in life. According to recent research from the European Union's Health Programmed 2014–2020, the total one-year prevalence of mental health issues is estimated to be approximately 38%25. In Europe, these disorders account for the third most disability-adjusted life years (DALY) (Xue et al., 2018). The World Health Organization defines mental health as "a condition of well-being in which each individual realizes his or her own potential, can cope with typical stressors of life, can work creatively and fruitfully, and can contribute to her or his community." Mental health is influenced by several variables. Physical (in)activity, unhealthy diets, alcohol, and drug consumption, social setting, work-life, and family history have all been found to have an influence on mental health in various circumstances(Zhao et al., 2021). PA is necessary for human health and wellbeing. PA is associated with mental health benefits, according to a recent analysis published in 2021. Furthermore, there was an inverse relationship between physical activity levels and mental health concerns(Maynou et al., 2021). Studies have shown that individuals without mental symptoms who exercise frequently have better moods than those who do not. It should be emphasized, however, that a relationship between improved mood and medium- or long-term physical activity has not been consistently proven for normal people(Sexton et al., 2001),(Engels et al., 2002). PA has long been known to provide health advantages, such as a lower risk of noncommunicable diseases and lower levels of stress, anxiety, and depression((WHO) & others, 2020). Adults (including the elderly) should engage in at least 150 minutes of moderate-intensity aerobic PE every week, or 75 min of vigorous-intensity PA or an equivalent combination each week according to the WHO(for Europe, 2021). Adults will benefit from conducting exercises that maintain or enhance muscular strength and endurance for at least two days per week to promote and maintain excellent health and physical independence(Nelson et al., 2007). According to the study in 2018, 19 nations (70.4 percent) have formulated national policy recommendations on PE for health. Adults are targeted 18 (66.7%), young kids are targeted 17 (63.0%), and senior adults are targeted 16 (59.3%)(Breda et al., 2018). According to the American College of Sports Medicine(Haskell et al., 2007), All healthy individuals aged 18–65 years need moderate-intensity aerobic PA for at least 30 minutes five days a week or vigorous-intensity aerobic physical exercise for at least 20 minutes three days a week to promote and maintain health(Haskell et al., 2007).

This recommendation can also be achieved by combining moderate- and vigorous-intensity activities28. For example, a person can satisfy the recommendation by jogging for 20 minutes twice a week and walking fast for 30 minutes twice a week. Moderate-intensity aerobic activity, which is generally equal to a brisk walk and notably raises the heart rate, can be collected over time in bouts of 10 minutes or more to reach the 30-minute minimum(Nelson et al., 2007). The national recommendations in ten nations were solely based on WHO recommendations, while one country's recommendations were based on EU PA requirements. Other international recommendations, such as those of the US Department of Health and Human Services, Canadian guidelines(Tremblay, Warburton, et al., 2011), the American College of Sports Medicine, and the American Heart Association(Haskell et al., 2007), or a mix of numerous international recommendations, were followed by eight nations(Breda et al., 2018). PA has been shown to improve mental wellness. PA may have an important role in increasing Health related quality of life HRQoL and consequently good aging(C. Hu et al., 2017). Health-Related Quality of Life HRQoL, which includes an individual's physical and mental well-being, is a key term in health research that may assist influence decisions about disease prevention and treatment. Previous cross-sectional research has consistently found a positive relationship between PA and HRQoL and believed that higher PA levels are linked to improved HRQoL(Yong et al., 2021),(Remes et al., 2016). The current study's findings in 2021 revealed that the frequency of moderate PA at baseline is associated with HRQoL at follow-up among community-dwelling older individuals over 70, including both physical and mental HRQoL(Jacinto et al., 2021).

Physical Activity and Physical Function

Physical function is a strong and independent predictor of all-cause death and hospitalization in the future. Physical function is nearly as essential as pain relief for persons with chronic pain(Bennett et al., 2005). A multimodal PA program that includes aerobic, strengthening, and flexibility activities will significantly improve physical function, like suffering(Sañudo et al., 2012). Following surgery, a higher level of physical activity has been connected to more weight reduction(Egberts et al., 2012). According to one study, physical activity increased following surgery, however there was a lot of variety in the outcomes(Jacobi et al., 2011). Besides from weight reduction, some studies have found that following surgery, physical function outcomes such as cardiovascular endurance and muscular fitness improve(Handrigan et al., 2010),(King et al., 2012). Chronic kidney disease affects almost three million individuals in the UK, with over 61,000 people requiring dialysis or a kidney transplant. Notably, dialysis patients who engage in regular physical activity had a lower risk of cardiovascular disease and mortality(MacKinnon et al., 2018). Even a modest increase in regular PA levels can enhance self-reported quality of health and life in individuals with non-dialysis, as well as exercise tolerance and cardiovascular reactivity(Koufaki et al., 2013). Reduced physical function and PA are both associated with a higher risk of cardiovascular disease (CVD) and all-cause mortality in older persons, as well as other chronic disease populations like diabetes(Wilund et al., 2021). Physical function and physical activity are two important ‘modifiable' lifestyle characteristics that can help non-dialysis chronic kidney disease and renal transplant recipients improve their quality of life and minimize mortality and clinical side events(Wilund et al., 2021). Movement treatments like Tai Chi and yoga increase strength, balance, and mobility while also reducing anxiety and depression in patients with fibromyalgia, osteoarthritis, and rheumatoid arthritis, resulting in improved physical function(C. Wang, 2012),(Carson et al., 2010). Moderate-to-high-intensity resistance exercise improves physical function with minimal danger of exacerbating pain or having other negative consequences if patients keep to a regular activity schedule with modest improvement(Kaleth et al., 2013). According to the Kaleth et al, participants were able to self-select activities that matched a metabolic equivalent (MET) level for moderate to strenuous activity, and their physical function improved dramatically.

Physical Activity and Economic Benefits

PA promotion among populations is a worldwide health investment that includes the prevention and treatment of noncommunicable diseases (NCDs), as well as promoting mental health and quality of life(Organization, 2019). PA had the greatest favorable influence on the risk of all-cause mortality of all the lifestyle behaviors (33 % reduction). Insufficient physical activity (IPA) causes 3.2 million deaths per year (including 9% premature deaths), and physical inactivity was responsible for 69.3 million disability-adjusted life years (DALYs) in 2010(Organization, 2014). In 2016, 27.5 % of people worldwide (25 % – 32.2 %) had IPA, with 162 % (14 % – 179%) in low-income countries and 26 % (22 %– 318 %) in middle-income nations(Guthold et al., 2018). PA promotion is vital if these economies are to achieve the WHO aim of a 15% relative reduction in the prevalence of IPA by 2030(Organization, 2018). Self-reported accessibility to trails, places to exercise, and attractive scenery were major built factors related with physical activity, according to a prior study of socioeconomically disadvantaged groups in the United States(Lovasi et al., 2009). Street connection, greenness, destination density, and general walkability were found to be connected with physical activity among socioeconomically disadvantaged persons in Canada(Christie et al., 2021). In primary care, walking (always) during leisure time has been related to lower healthcare spending. In Brazil, higher medical spending was related to decreased participation in PA at work (OR=1.58, 95% CI=1.06 to 2.35) and sport (OR=1.57, 95% CI=1.12 to 2.18)(Ranasinghe et al., 2021). According to two Malaysian research, people with greater economic levels are less likely to participate in PA(Ranasinghe et al., 2021). The study found that the low financial of the metropolitan population used more active transportation (walking and cycling) than the wealthiest quintile (2–5 times more)(Ranasinghe et al., 2021). Similarly, in China, more income was linked to reduced PA(Chen et al., 2015). In Malaysia, Individuals with health insurance are 3.2 % more likely to engage in PA, but they do not spend more time than those who do not have health insurance(Cheah et al., 2017). A recent study in Brazil found that combining PA with medication therapy for the treatment of chronic diseases as a treatment program for >50-year-old attendees of selected primary healthcare settings provides good value for money. Individuals on' medications only' had a higher cost–utility ratio (US$3.92/QALY) than those on 'medication plus regular PA' (US$3.21/QALY) and 'no medication or PA' (US$0.12/QALY)(Queiroz et al., 2020). In a study in 2016 has been evaluated health and

economic benefits of physical activity for patients with spinal cord injury (SCI). They found rehabilitation methods and technology that increase functional mobility have the potential to lower the risk of medical consequences and costs associated with SCI dramatically. However, Patients who can engage in physical exercise profit greatly from their health and save money on their medical bills. In comparison to inactive patients, patients who exercise at least twice a week have a 50% lower chance of hospitalization in their first year(Miller & Herbert, 2016).

Purpose of the thesis

Physical activity epidemiology examines the relation between physical activity and disease and other health outcomes, as well as the distribution of physical activity in the population, its determinants, and its interactions with other behaviors. With respect to determinants of physical activity, we chose to focus this thesis on specific types and domains of physical activity such as Curves, Pilates, Mind-body exercise (Tai chi, Qigong, Yoga), and adherence to the physical activity guideline. With respect to health outcomes, we concentrated on Alzheimer's disease, Breast cancer, Obesity, Low back pain, and health-related quality of life, lifestyle, and life expectancy.

The aim of this thesis is to investigate the relationship between physical activity to improving physical and mental health in a variety of people.

Protocol version

November 2018 - November 2021

Research Question

The overall aim of this thesis was to quantify public health aspects of physical activity. Specifically, we explored the following issues:

- Is there an association between physical activity on mental health of patients with Alzheimer?
- Is there an association between Curves Training Program with Body Weight, Body Circumferences and Fat Mass Percentage?
- Is there an association between Tai Chi and Qigong on Fatigue and Quality of Life among Patients with Breast Cancer?
- Is there an association between Pilates- Based Exercise to Reduction Pain in Patients with Low Back Pain?
- Is there an association between Tai chi and Workplace Wellness with Health Care Worker?

In chapter 2 physical activity on the mental health of patients with Alzheimer's is described. Chapter 3 of this thesis represents our validation study of the Lifestyle and Life Expectancy Questionnaire in an Italian sample. Chapter 4 deals with the Curves Training Program with Body Weight, Body Circumferences, and Fat Mass Percentage. Chapter 5 presents the association between Tai Chi and Qigong on Fatigue and Quality of Life among Patients with Breast Cancer. In chapter 6, the association between Pilates- Based Exercise to Reduction Pain in Patients with Low Back Pain by umbrella review is highlighted. Chapter 7 describes the systematic review and association between Tai chi and Workplace Wellness with Health Care Worker. A general discussion of the different topics described in this thesis is given in chapter 8.

Qualification Researchers

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Chapter 2

Effect of Physical Activity on Mental Health of Patients with Alzheimer

Effect of physical activity on mental health of patients with Alzheimer[*]

Abstract

Background: Alzheimer's disease is one of the most common neurodegenerative diseases that can affect the lifestyle and quality of life of people, so the purpose of this study is to investigate the lifestyle, life expectancy, and quality of life of Alzheimer's patients with a physical activity approach.

Method: This cross sectional study in Iran and Pilot study in Italy assessed physical activity, lifestyle, life expectancy and quality of life in patients with Alzheimer's disease. The Participants were Alzheimer patients who located in stage 1 or 2 of this disease. The short version of the International Physical Activity, Miller & Smith Lifestyle, Schneider Life Expectancy and QUALITY OF LIFE (WHOQOL) -BREF Questionnaires were completed by all subjects. Kolmogorov-Smirnov, Pearson correlation coefficient, one-way analysis of variance with Tukey posts hoc and Multiple regression tests were used to analyze the finding ($P \leq 0.05$).

Result: The findings study in Iranian demonstrated that there is a significant positive relationship between physical activity and lifestyle improvement, life expectancy and quality of life in Alzheimer's patients. ($P \leq 0.05$); Lifestyle and quality of life in patients with moderate and low physical activity were significantly better than inactive patients ($P \leq 0.05$) moreover , life expectancy in patients with moderate physical activity was significantly higher than inactive patients ($P \leq 0.05$).

The results of a second study in Italy displayed a significant difference in quality of life along with domains of physical health, psychological, social relationship, and environmental in inactive, low physical activity and moderate physical activity in Alzheimer's patients ($P \leq 0.05$).

Conclusion: It seems that low to moderate intensity exercise has beneficial effects on lifestyle and quality of life in people with Alzheimer, however, the effects of moderate-intensity exercise are

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https://springernature.eu.qualtrics.com/jfe/form/SV_3UejQncTro7c3T7?T=0&M

more favorable than low-intensity exercise. Therefore, moderate intensity exercise is recommended in these patients.

Introduction

Aging is the major risk factor for Alzheimer's disease (AD), and the most common cause of dementia (Honarvar et al., 2020). AD and other dementias are prevalent neurodegenerative diseases characterized by decreased cognition, poor memory, physical function, and quality of life. AD is a neurodegenerative disorder characterized by a disconnection syndrome in which connectivity between brain areas is disrupted. It suggests that the brain network changes as a person progresses from a healthy state to Mild Cognitive Impairment (MCI) and AD. Prediction of MCI and conversion to AD in cognitively normal older persons is a top objective for AD research since intervention prior to the occurrence of overt and irreversible neuronal loss is crucial for maintaining normal brain function(Ahmadi et al., 2020). Currently, this disorder affects millions of people around the world (Watson et al., 2020). Approximately 35 million people globally are living with dementia and every 3 seconds, someone develops it and expected to continue to increase each year with an assessed 66 million diagnosed with dementia by the year 2030 (Watson et al., 2020) and more than 152 million by 2050 (Jia et al., 2019). However, there is currently no heal for dementia. In fact, treatment and support need to be applied as early as the preclinical stage of the disease (Jia et al., 2019). There are seven stages associated with Alzheimer's disease: Before Symptoms Appear and normal, Basic Forgetfulness , mild cognitive impairment due to Alzheimer's disease and Noticeable Memory Difficulties, mild dementia due to Alzheimer's disease, moderate dementia due to Alzheimer's disease and more than memory loss, moderate Alzheimer's disease and decreased Independence, moderate severe symptoms and severe Alzheimer's disease and lack of physical control(Reisberg & Franssen, 1999). In Iran and the other countries, the population of elders has risen from 6.6% in 1995 to 10% in 2010 and is predicted to reach 25.1% in 2061(Honarvar et al., 2020). According to current estimates, around 9 million individuals in Europe suffer from dementia, the most common of which is AD(Europe, 2019). Furthermore, the current definition of AD has been expanded to include both pre-dementia and dementia stages (Alzheimer's dementia), as well as preclinical and prodromal AD or MCI related to AD(Europe, 2019). The impacts of coronavirus disease 2019 (COVID19) on a worldwide scale have been clearly documented. COVID-related mortality is highest among the elderly and those with dementia, and the social consequences of COVID, such as isolation, are likely to affect them

disproportionately(O'Shea, 2020). People over the age of 60 suffering from AD spend around 11.2% of their lives with disabilities. The total cost of medicine and health care for affected people with AD is three times greater than that of other people. On the other hand, since there is no effective treatment for this disease today, prevention and lifestyle modification are critical(Navipour et al., 2019). Health-related quality of life (HRQoL) influences vast aspects of health like physical and mental health, autonomy, social interaction, and the relationship between a subject and their environment (Honarvar et al., 2020). The cognitive reduction is distressing and may lead to psychosocial problems that seriously affect the HRQOL of older people (Jia et al., 2019). Most Alzheimer's patients have to experience neuropsychiatric symptoms and cognitive impairment during the period of their diseases such as apathy, agitation, and psychosis (LboomEike et al., 2019). Lawton established a broad conceptual framework for quality of life (QoL) in people with cognitive impairment that includes 4 domains of importance: behavioral competence, the objective environment, psychological well-being, and perceived QoL(Leung et al., 2020). The assessment of QoL is completely personal and a reflection of personal experiences. The studies demonstrated the patient's HRQoL made evaluation by own or by family or relative and numerous studies have shown discrepancies between HRQoL as assessed by patients with AD, and the corresponding evaluation by their caregiver, mostly observing that loved ones underestimate the patient's HRQoL(Barbe et al., 2018). The results in the study by Barbe et al 2018 and Chan et al 2011 showed that depression is a frequent comorbidity in patients with AD and also there is a direct link between depression and both the patient and caregiver scored of QoL(Barbe et al., 2018),(Chan et al., 2011).

Physical activity (PA) is an antioxidant and anti-inflammatory action that has shown a positive impact on aging and neurodegeneration and represents a possible treatment option in cognitive decline.in addition, PA reduces neuro inflammation and improved memory(Um et al., 2020). The study in 2020 reported that inactivity has been recognized as a risk factor for increased memory loss and development of AD (Watson et al., 2020). The results of a recent meta-analysis indicated that different physical exercise programs have a useful impact on patients with dementia, leading to significant improvements in cognitive function, memory and ability to perform daily activities (Improta-caria et al., n.d.) which is in agreement with Rui Xia Jia in 2019 (Jia et al., 2019). Evidence from Yang et al in 2015 on fifty Alzheimer patients conducted that 3 months of aerobic

exercise with moderate intensity can to some extent improve cognitive performance among these patients with cognitive impairment (Yang et al., 2015).

The average life expectancy in the world has increased substantially in the past few decades (Cristina et al., 2016). People with chronic diseases including cancer, cardiovascular disease, and diabetes have a shorter life expectancy than their peers without these chronic conditions. People with early-onset AD seem to suffer greater impact (Ziyarati, 2016). A healthy lifestyle helps to optimize the well-being and health outcomes of individuals throughout their lifetime. Previous research has shown that a healthy lifestyle is associated with an increase in the quality of life and life expectancy (Bott et al., 2019). Lifestyle includes a vast concept such as alcohol consumption, smoking, physical activity, social support, and genetic factors. Environmental factors and lifestyle not only are effective in the prevention of Alzheimer's disease but also improve mental health and well-being in the elderly (Umr-s & Cyceron, 2018). Improving lifestyle is an effective solution to cognitive development and increase perception and reduce the risk of AD or delay it (Bott et al., 2019).

Aging populations across the world have led to an increasing prevalence of both AD and depression. With the rising number of people with AD, it is expected that the economic burden on the health care system enhances in the upcoming years. In this thesis was conducted to determine the effect of physical activity on mental health in patients with Alzheimer in Iran and Italy.

Methods

Study Design participants and inclusion criteria

Because of the researchers' expertise of the cultures of both nations, this research was conducted in two specific locations in two countries: Italy and Iran. Iran and Italy are two countries on two continents with two civilizations and faiths that are very distinct. The researchers reasoned that if the outcomes of the two experiments were similar, the findings may be applied to everybody. It is evident that more study will be required to corroborate this. This cross-sectional study in Iran and Pilot study in Italy assessed the effect of physical activity on lifestyle, life expectancy and quality of life in patients with AD, who located in stage 1 or 2 . participations were the member of AD Association in Shiraz province (Iran) and Alzheimer's patients in the Sapienza university of Rome teaching hospital, policlinico Umberto 1, under the supervision of Professor Evaristo Ettorre in Rome, Italy. The collected data has done from July to October 2020 in Iran and July to December 2021 in Italy. The local ethics committee of Islamic Azad University-Marvdasht Branch approved the study. The ethics number IR.IAU.M.REC.1399.049.

Participants and inclusion criteria

To conduct this cross-sectional study, we first referred to the AD association of Shiraz (Iran) and after explaining the current research process to the Chief Executive Officer (CEO) of this association and preparing a list of members of this association, the implementation process is explained to members and among volunteers (based on Morgan table), 85 people were selected as a statistical sample. In this Pilot study in Italy, we were recruited 25 at the university hospital of Policlinico Umberto 1. According to the COVID19 epidemic, patients' access has been limited, and they have faced suffering.

Inclusion criteria in the present study include patients over 60 years old, non-smoking, and non-use of certain medications (depression, anxiety, and hypnotics). Physical activity (IPAQ),

lifestyle, life expectancy, and quality of life questionnaires (QOL) were completed by Alzheimer's patients under supervision and control of dementia Caregivers who lived or spent every day with them. Patient's age was 72.89 years (SD = 9.90), educational level was 1.22 (SD = 0.49).Thirty-seven percent were male, and sixty-two percent were female in Iran. In Italy, the patient was 80.44 years old (SD = 6.73) and had a 1.64 (SD = 1.07) educational level. The 36.7 percent of the population was male, and 46.7 percent of the population was female.

Ethics

The following ethical considerations were included in the study:

- Obtained permission of the Ethics Committee
- Introduce yourself to the participants
- Explain the aims and methods used in the research to the participants
- Reassuring participants about the interview confidentiality and anonymity
- Volunteer participation in the study and the possibility of leaving the study at any stage of the study
- Make the research results available to the participants if they wish
- The project was submitted to the ethics committee approval at Islamic Azad University-Marvdasht Branch. The ethics number is IR.IAU.M.REC.1399.049 and ethical Committee approval at the Sapienza University of Rome.

International physical activity questionary

In the present study, short version of the international physical activity questionnaire (IPAQ) as used to assess the physical activity level(Bauman et al., 2000). The questionnaire consists of seven questions that are self-report in the form of measuring last week's physical activity (Bauman et al., 2000). In this questionnaire, walking is 3.3 MET, moderate physical activity is 4 MET and intense physical activity is 8 MET. To calculate the total amount of physical activity per week, the walking (day × minute × MET), moderate physical activity (day × minute × MET), and intense physical activity (day × minute × MET) per week were added together. According to the formula (MET-min/week), the energy expenditure during walking, moderate and intense activity was calculated. If the sum of MET-min/week in walking, moderate and intense activity for seven days was at least 3,000 or more, between 600- 3,000, and lower than 600; categorized as high physical activity, moderate physical activity, and low physical activity respectively. Also, people who did not report any physical activity were categorized as inactive (Bauman et al., 2000),(Brown et al., 2018),(Dpe, 2011). Appendix A.

Lifestyle questionary

Lifestyle was measured using the Miller and Smith lifestyle questionnaire. The lifestyle questionnaire is proposed as one of the important determining elements in people's general health, globally. Miller-Smith Lifestyle assessment inventory consists of 20 items with a 5-point Likert-type scale that asks respondents how often the related items are apply to them. It was used to assess the lifestyle of Alzheimer patients, including exercise, sleeping, spirituality, social relations, overall health status, weight, nutrition, smoking and affection. Response choices range from 1 (always) to 5 (never). Total scores range from 20 to 100 (Lifestyle & Inventory, n.d.). Scores of the statement of each component were summed up, converted into percent scores, and the total was divided by the number of the items, giving a mean score for each component. Higher scores indicate an unpleasant and unhealthy lifestyle(Rezazadeh et al., 2010),(Gomaa et al., 2020). The respondent's lifestyle was considered excellent/healthy if the total score was less than 50%, very good/moderate 50% - 70 %, good/Mild 70% - 95%, and unhealthy/poor if the score

was > 95%. Miller and Smith (1988) reported the reliability as α=0.85. The AMOS (version 22.0, Chicago: IBM SPSS) was applied to analyze research data by structural equation models (P<0.001). Appendix B.

Quality of life questionary

We used a brief version of the WHO's QOL scale (WHOQOL-BREF) in this study. The WHOQOL-BREF questionnaire contains two items from the Overall QOL and General Health and 24 items of satisfaction that divided into four domains: Physical health with 7 items, questions 3, 4, 10, 15, 16, 17, and 18 (DOM1), psychological health with 6 items, questions 5, 6, 7, 11, 19, and 26 (DOM2), social relationships with 3 items, questions 20, 21 and 22 (DOM3) and environmental health with 8 items, questions 8, 9, 12, 13, 14, 23, 24 and 25 (DOM4). For scoring, the scores of each item are in the range of 1 to 5, respectively, not at all, low, medium, high and completely; or very dissatisfied, dissatisfied, relatively dissatisfied, satisfied, and completely satisfied (Gholami et al., 2013). Appendix C.

Schneider life expectancy questionnaire

Schneider's Life Expectancy Questionnaire consists of 12 items and aims to assess the level of life expectancy in individuals. The statements of the questionnaire include 4 statements for measuring agency thinking, 4 for strategic thinking and 4 as deviant statements. So, it consists of two sub-scales: agency and strategy. This questionnaire assesses the two dimensions of life expectancy: (1) the energy for achieving goals in life; and (2) the personal plan for achieving goals in life. The scoring is based on a 5-point Likert scale, from 1 (totally disagree) to 5 (totally agree). Sum of strategy and factor subscale scores determines the total score of hope. Preliminary evidence about the validity of the test is provided by Schneider et al. (Schneider et al., 2005). Cronbach's alpha is between 74% and 84% and reliability is calculated 80% over a period of 10weeks (Asqari & Donyavi, 2018). Many researchers have supported the validity and reliability of the questionnaire as a measuring scale. The internal consistency range of the test has been reported 0.74-0.84 and

the validity of test-retest 0.80, while for the time period beyond 8-10 weeks, those figures would be higher (Shalkouhi et al., 2015). Appendix D.

Statistical analysis

Kolmogorov- Smirnov test was used to assess the normal distribution of findings. Due to the abnormal distribution of physical activity findings, Kruskal- Wallis and Mann-Whitney U tests were used. Also, due to the natural distribution of lifestyle findings, life expectancy, and quality of life along with the physical health, psychological, social relations, and environmental domains, a one-way ANOVA test was used along with Tukey's post- hoc test. Pearson correlation coefficient test was used to examine the correlation between physical activity and lifestyle, life expectancy, and quality of life ($P \leq 0.05$). Multiple Linear Regression analyses with cognition, functional capacity and QoL as the dependent variables and physical activity, lifestyle and life expectancy as independent variables were used.

Results in Iran

The demographic characteristics of the subjects are reported in Table 1. Also, the levels of lifestyle, life expectancy, physical activity, and quality of life along with domains of physical health, psychological, social relation, and environmental are reported. The results of one-way ANOVA (Table 2) showed a significant difference in lifestyle, life expectancy, quality of life along with domains of physical health, psychological, social relationship, and environmental in inactive, low physical activity and moderate physical activity in AD patients ($P \leq 0.05$).The results of Tukey's post- hoc test (Table 2) showed that the lifestyle of patients with moderate ($P = 0.001$) and low ($P = 0.009$) physical activity was significantly better than inactive patients. Life expectancy in patients with moderate physical activity was significantly higher than inactive patients ($P = 0.011$). Quality of life in patients with moderate ($P = 0.001$) and low ($P = 0.002$) physical activity was significantly better than inactive patients(Table 2). Physical health domain (in quality of life) in patients with moderate physical activity was significantly higher than inactive patients ($P = 0.001$) and low physical activity ($P = 0.008$) , the psychological domain in

patients with moderate physical activity was significantly higher than inactive patients (P = 0.001) and low physical activity (P = 0.03). Also, in patients with low physical activity was significantly higher than inactive patients (P = 0.009). The social relation domain in patients with moderate physical activity (P = 0.001) and low physical activity (P = 0.008) was significantly higher than inactive patients. Also, the environmental domain in patients with moderate physical activity (P = 0.007) and low physical activity (P = 0.001) was significantly higher than inactive patients. The results of the Kruskal- Wallis test showed that there was a significant difference in the level of physical activity in AD patients (P = 0.001). The results of the Pearson correlation coefficient test showed a significant positive relationship between physical activity and lifestyle improvement (P = 0.002), life expectancy (P = 0.001), and quality of life (P = 0.001) in AD patients (Table 3). To determine the multiple linear regression equation, we considered QOL as a dependent and physical activity, lifestyle, and life expectancy as independent variables(Table 4). The results of this test demonstrated among women, lifestyle (P = 0.00) (β = -0.75) and life expectancy (P = 0.01) (β = 0.89) was significant effect on the quality of life in patients with Alzheimer disease. Lifestyle in men (P = 0.004) (β = -0.52) also was significant effect on quality of life but in women is better than men (Table 4). Furthermore, the findings of physical activity explained significant effect on quality of life (P = 0.049) (Table 4).

Table 1. Demographic characteristics of subjects

Group	Age (y)	Gender	
		Female (number)	Male (number)
Inactive	68.25 ± 9.21	14	2
Low physical activity	74.68 ± 9.77	12	9
Moderate physical activity	73.23 ± 9.92	13	21
Total	72.89 ± 9.90	53	32

Table 2. The results of one- way ANOVA test with Tuckey post hoc test compare the lifestyle, life expectancy and quality of life between AD patients

variables	Inactive	Low physical activity	Moderate physical activity	P- value
	Mean(SD)	Mean(SD)	Mean(SD)	
Lifestyle	71.00(13.44)	58.40(16.13) **	53.58(11.18) ***	**0.001**
Life expectancy	35.50(4.67)	37.62(6.64)	41.41(7.26) *	0.007
Quality of life	54.50(16.94)	72.20(18.85) **	79.78(15.10) ***	**0.001**
Physical Health Domain	14.31(3.70)	17.71(5.94)	21.48(4.72) *** ++	**0.001**
Psychological Domain	10.06(5.01)	14.60(5.24) **	17.70(4.72) *** +	**0.001**
Social relationship Domain	5.43(3.84)	8.54(3.95) **	9.66(2.38) ***	**0.001**
Environmental Domain	19.75(5.96)	25.65(5.02) ***	24.59(4.88) **	**0.001**

***** P≤0.001, ** P≤0.01, * P≤0.05 Significantly better than inactive patients**
++ P≤0.01, + P≤0.05 Significantly better than inactive patients

Table 3. The results of Pearson correlation coefficient test for assess the relationship between physical activity and lifestyle, life expectancy and quality of life in AD patients

Dependent variable		Life expectancy	Lifestyle	Quality of life
Physical Activity	**Pearson Correlation**	R= 0.39	R= 0.29	R= 0.40
	Sig P≤0.05	**P=0.00**	**P= 0.00**	**P= 0.00**
	N	85	85	85

Table 4 – Results of the Multiple Linear Regression analysis - Dependent variable: QOL

Variables.	All patients				Females				Males			
	full model		Backward elimination		full model		Backward elimination		full model		Backward elimination	
	Beta	p	Beta	p	Beta	p	Beta	p	Beta	p	Beta	p
lifestyle	-,756	**P=0.001**	-,822	**P=0.001**	-,750	**P=0.000**	-,788	**P=0.000**	,001	P=0.999	-,524	**P=0.004**
life expectancy	,297	P=0.247	-	-	,891	**P=0.011**	,809	**P=0.010**	,006	**P=0.059**	-	-
Physical activity	,004	P=0.122	,004	**P=0.053**	-,001	P=0.718	-	-	-,179	P=0.514	,006	**P=0.049**
R^2	0,609	-	0,593	-	0,660	-	0,654	-	0,441	-	0,422	-

Results in Italy

The characteristics of the participants are summarized in Table 5. In total, 25 elders participated in this pilot study. The results of Kolmogorov-Smirnova test showed that data distribution was normal (P≥0.05) Table 6. The results of one-way ANOVA (Table 7) showed a significant difference in QOL along with domains of physical health, psychological, social relationship, and environmental in inactive, low physical activity and moderate physical activity in AD patients (P≤0.05). The findings of Tukey's post- hoc test (Table 7) showed that QOL in low(P=0.001) and moderate physical activity (P=0.01) was significantly higher than inactive patients. Physical health domain (in quality of life) in patients with low physical activity (P = 0.01)was significantly higher than inactive patients and patients with moderate physical activity. The psychological domain in patients with low physical activity was significantly higher than inactive patients (P = 0.001) and moderate physical activity (P = 0.01). furthermore, the social relation domain in patients with moderate physical activity (P = 0.001) was significantly higher than low physical activity (P = 0.01) and inactive patients. The results of environmental domain displayed that in patients with moderate physical activity (P = 0.02) was significantly higher than low physical activity and inactive patients (Table 7). The results of the Pearson correlation coefficient test showed a significant positive relationship between physical activity and QOL (P = 0.002) in AD patients (Table 8). The corresponding β-coefficients from multivariable linear regression models, adjusted for lifestyle, life expectancy and physical activity, are presented in Table 9. The study demonstrated that there was not significantly associated between QOL as dependent variable and lifestyle, life expectancy and physical activity as independent variables(Table 9).

Table 5. Demographic characteristics of subjects

Group	Age (y)	Gender	
		Female (number)	Male (number)
Inactive	1.58 ± 0.50	10	7
Low physical activity	1.66 ± 0.57	2	1
Moderate physical activity	1.40 ± 0.54	2	3
Total	1.56 ± 0.50	14	11

Educational level	Elementary	50.0%
	Lower average	10.0%
	Higher Diploma	13.3%
	Graduation	6.7%
Marital status	married	40.0%
	divorced	3.3%
	single	6.7%
	widow	30.0%

Table 6. One sample Kolmogorov-Smirnova test

Dependent variable		Life expectancy	Lifestyle	Quality of life
Physical Activity	**Pearson Correlation**	0.123	25	**P=0.200***
	Sig P≤0.05	0.091	25	**P=0.200***
	N	0.091	25	**P=0.200***

*** P≥0.05 Accept the null hypothesis and Normal distribution**

Table 7. The results of one- way ANOVA test with Tuckey post hoc test compare the lifestyle, life expectancy and quality of life between AD patients

variables	*Inactive*	*Low physical activity*	*Moderate physical activity*	*P- value*
	Mean(SD)	**Mean(SD)**	**Mean(SD)**	
Lifestyle	6.41 (0.63)	-6.41(0.63)	-13.41(0.06)	0.07
Life expectancy	-10.64 (0.10)	10.64(0.10)	6.64(0.48)	0.09
Quality of life	-33.90(0.00)	33.90(0.00)***	25.03(0.01)**	**0.001**
Physical Health Domain	-1037(0.01)	10.37(0.01)**	5.50(0.14)	**0.01**
Psychological Domain	-10.52(0.00)	10.52(0.00)***	7.12(0.01)**	**0.001**
Social relationship Domain	-4.62(0.01)	4.62(0.01)**	4.69(0.00)***	**0.001**
Environmental Domain	-5.66(0.14)	5.66(0.14)	6.20(0.03)*	**0.02**

***** P≤0.001, ** P≤0.01, * P≤0.05 Significantly better than inactive patients**

Table 8. The results of Pearson correlation coefficient test for assess the relationship between physical activity and lifestyle, life expectancy and quality of life in AD patients

Dependent variable		**Life expectancy**	**Lifestyle**	**Quality of life**
Physical Activity	**Pearson Correlation**	R= -0.001	R= -0.356	R= 0.439
	Sig P≤0.05	P=0.997	P= 0.081	**P= 0.028**
	N	25	25	25

Table 9. Results of the Multiple Linear Regression analysis - Dependent variable: QOL

Variables	All patients			
	full model		Backward elimination	
	Beta	p	Beta	p
lifestyle	-0.19	0.38	-0.19	0.38
life expectancy	-0.18	0.44	0.18	0.44
Physical activity	0.36	0.11	0.36	0.11
R^2	0.575	-	0.575	-

Discussion

The results of the study in Iran, demonstrated that lifestyle, quality of life, social relations, psychological and living environment in patients with moderate and low physical activity were significantly better than inactive patients. The findings of a pilot study conducted in Italy, demonstrated that quality of life, social relations, psychological and living environment in patients with Alzheimer was significantly and positively with low and moderate physical activity.

Aging and global increase older people is an inevitable phenomenon that has been recognized as public health challenges and social care in the 21st century(Honarvar et al., 2020). Becoming older, is associated with physical-mental disorders and dementia. Alzheimer is also one of the most common dementia diseases that has significantly caused physical, emotional, and quality of life problems in these people. Alzheimer's disease was significantly and inversely related to the quality of life, education, and physical activity, and was directly related to age, chronic diseases, and body mass index; In addition, the relationship between quality of life and Alzheimer's disease was affected by gender, so that in men the quality of life of patients is affected more than women(Honarvar et al., 2020). The effects of Alzheimer's disease depend on gender, age, level of physical activity, and lifestyle. long-term and regular physical activity as a method of preventing neuronal damage and memory loss(De la Rosa et al., 2020). It seems that exercise can help reduce anxiety and depression by modulating oxidative stress, regulating neurotransmitters, improving synapse function, increasing neurotrophies, improving muscle strength, increasing balance, improving aerobic power, and losing weight (Azarian et al., 2019). In this regard, researchers have shown that exercise, regardless of its intensity as a non-pharmacological intervention, can have beneficial effects on quality of life in people with Alzheimer's disease and depression (Tavares et al., 2014). Researchers displayed that 12 months of moderate to vigorous exercise increased physical activity and performance (Lamb et al., 2018). In the study by Chamberlain et al in 2020 showed that strength training improved the quality of life in patients with Parkinson's disease but had no significant effect on their athletic performance(Chamberlain-carter et al., 2020), also combined exercise and resistance training improved social relationships and cognitive function in Alzheimer's patients (Demurtas et al., 2020). However, studies on the type of exercise, duration of exercise and also the intensity of exercise have not reached a single result, so that a study demonstrated that high and low intensity exercise it has no significant effect on endurance,

movement, balance, leg strength and cognitive function in patients with dementia, while walking speed increased in the high-intensity exercise group (Sanders et al., 2020). It seems that the level of physical activity, age, diet, differences in the statistical population are the reasons for inconsistency with this study. Moreover, it appears that the number of training sessions and the observance of the principle of overload are very important to create adaptations due to exercise, so doing high-intensity exercise is more desirable than low-intensity exercise. In confirmation of this issue, the results of our study displayed that the level of life expectancy, physical health, psychological range, and physical activity in patients with moderate physical activity was significantly higher than patients with low physical activity. Studies have shown that the level of physical fitness was significantly associated with speech and memory. also, both physical health and physical activity were significantly associated with quality of life and in general concluded that physical health is more related to cognitive function (Daimi et al., 2020). There is a significant relationship between physical health, physical activity and lifestyle improvement, life expectancy, and quality of life in Alzheimer's patients. Stephen et al at 2017 Showed that there was an inverse relationship between physical activity and the risk of Alzheimer's disease (Stephen et al., 2017). However, they expressed that variables such as age, type of exercise, the intensity of exercise, duration of exercise, dementia at the beginning of the exercise program are effective in choosing the appropriate method of exercise(Stephen et al., 2017).

According to the effect of education, gender, low number of samples, and differences in the duration of Alzheimer's disease on cognitive impairments, it seems that the lack of study of these variables and their relationship with physical activity is one of the limitations of the present study. The insufficient quantity of patients who participating in this study was another limitation of this study. Furthermore, the big issue of this study was that it faced with Covid pandemic and we have had trouble to directly access with Alzheimer's patients.

Therefore, these types of studies are recommended in future studies; Also, conforming to physiological changes and adaptations to physical activity, it appears that the absence of an evaluation of some neurotransmitters and their relationship with physical activity is another limitation of the present study. Therefore, the assessment of physiological markers is also suggested in future studies.

Conclusion

Low and moderate intensity exercise also seems to have beneficial effects on lifestyle and quality of life in people with Alzheimer, however, the effects of moderate-intensity exercise had more favorable effects than low-intensity exercise. Therefore, moderate-intensity exercise is recommended for these patients.

Appendix A
The questionnaire to assess International Physical Activity

1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?
   _____ days per week
   No vigorous physical activities Skip to question 3

2. How much time did you usually spend doing vigorous physical activities on one of those days?
   _____ hours per day _____ minutes per day
   Don't know/Not sure

   Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
   _____ days per week
   No moderate physical activities Skip to question 5

4. How much time did you usually spend doing moderate physical activities on one of those days?
   _____ hours per day
   _____ minutes per day
   Don't know/Not sure

   Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time? _____ days per week
   No walking Skip to question 7

6. How much time did you usually spend walking on one of those days?
   _____ hours per day
   _____ minutes per day
   Don't know/Not sure

   The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the last 7 days, how much time did you spend sitting on a weekday?
   _____ hours per day
   _____ minutes per day
   Don't know/Not sure

Appendix B

The questionnaire to assess Lifestyle

Read each item carefully; and then give it a rating from 1 to 5 depending on how often that item applies to you now:

1- Almost always 2- often 3- sometimes 4- occasionally 5- almost never

There are no right or wrong answers. The more accurately you answer, the better you will identify ways you can manage your stress.

1. I eat at least one hot; balanced meal a day.
2. I get seven to eight hours sleep at least four nights a week.
3. I give and receive affection regularly.
4. I have at least one relative within 50 km on whom I can rely.
5. I exercise to the point of perspiration at least twice a week
6. I smoke less than half a pack of cigarettes a day(non – smokers score 1)
7. I take fewer than five alcoholic drinks a week (non- drinkers score 1)
8. I am the appropriate weight for my height.
9. I have an income adequate to meet my basic expenses.
10. I get strength from my religious beliefs; or I feel comfortable with my view of the universe and my place in it.
11. I regularly attend club or social activities.
12. I have a network of friends and acquaintances.
13. I have one or more friends to confide in about personal issues.
14. I am in good health (including eyesight ; hearing; teeth)
15. I am able to speak openly about my feelings when angry or concerned
16. I have regular conversations with the people I live with about domestic problems e.g. chores; money and daily living issues.
17. I do something for fun at least once a week.
18. I am able to organize my time effectively.
19. I drink fewer than three cups of coffee (or tea or coke) a day.
20. I take quiet time for myself during the day.

Appendix C
The questionnaire to assess Quality of Life

Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

1. How would you rate your quality of life?
2. How satisfied are you with your health?
3. To what extent do you feel that physical pain prevents you from doing what you need to do?
4. How much do you need any medical treatment to function in your daily life?
5. How much do you enjoy life?
6. To what extent do you feel your life to be meaningful?
7. How well are you able to concentrate?
8. How safe do you feel in your daily life?
9. How healthy is your physical environment?
10. Do you have enough energy for everyday life?
11. Are you able to accept your bodily appearance?
12. Have you enough money to meet your needs?
13. How available to you is the information that you need in your day-to-day life?
14. To what extent do you have the opportunity for leisure activities?
15. How well are you able to get around?
16. How satisfied are you with your sleep?
17. How satisfied are you with your ability to perform your daily living activities?
18. How satisfied are you with your capacity for work?
19. How satisfied are you with yourself?
20. How satisfied are you with your personal relationships?
21. How satisfied are you with your sex life?
22. How satisfied are you with the support you get from your friends?
23. How satisfied are you with the conditions of your living place?
24. How satisfied are you with your access to health services?
25. How satisfied are you with your transport?
26. How often do you have negative feelings such as blue mood, despair, anxiety, depression?

Appendix D
The questionnaire to assess Life Expectancy

Directions: Read each item carefully. Using the scale shown below, please select the number that best describes you and put that number in the blank provided.

1 = Definitely False 2 = Mostly False 3 = Mostly True 4 = Definitely True

1. I can think of many ways to get out of a jam.
2. I energetically pursue my goals.
3. I feel tired most of the time.
4. There are lots of ways around any problem.
5. I am easily downed in an argument.
6. I can think of many ways to get the things in life that are most important to me.
7. I worry about my health.
8. Even when others get discouraged, I know I can find a way to solve the problem.
9. My past experiences have prepared me well for my future.
10. I've been pretty successful in life.
11. I usually find myself worrying about something.
12. I meet the goals that I set for myself.

Chapter 3

Lifestyle and Life Expectancy questionnaire validation and Assessment in an Italian Sample

Lifestyle and Life Expectancy Questionnaire: validation and assessment in an Italian sample[*]

Abstract

Objectives: The objective of this study was to evaluate the reliability and validity of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires in the Italian setting in order to make this instrument available for the determination of lifestyle and hope level in the different domains of everyday life.

Method: Before testing their psychometric properties, the original versions of the two questionnaires, lifestyle (Miller-Smith) and life expectancy (Schneider), were translated into the Italian language. We tested the instrument's psychometric properties on a sample of 18 patients over 60 years old with Alzheimer's disease in the Sapienza University of Rome teaching hospital, policlinico Umberto 1. Internal consistency was considered to assess the reliability of the results across items within the adopted scale by using Cronbach's α coefficient. Using Kolmogorov-Smirnov's test, the normality distribution was evaluated to guarantee the applicability of a parametric or non-parametric test. The software used to analyze data was SPSS version 26 for Windows.

Results: According to the outcome of our statistical analysis, the lifestyle scale showed high overall internal consistency, and the Cronbach's α coefficient for the total 20-item scale was 0.80 in the Italian population. On the other hand, using the 12-item questionnaire about life expectancy resulted in a high overall internal consistency of 0.93, according to the Cronbach's alpha test.

Conclusions: The outcome of our study shows that the Italian versions of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires demonstrated good psychometric properties and good characteristics of factorial validity for future epidemiological studies aimed at evaluating lifestyle and lifestyle expectancy in the Italian population and can as well be used in clinical practice and research.

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Introduction

Cognitive impairment is very common among the elderly. Dementia, the most severe form of cognitive impairment, is among the leading cause of disability among the elderly, affecting about 50 million people worldwide (Kivipelto, Mangialasche, and Ngandu 2018). Alzheimer's disease (AD), the main cause of dementia, is one of the most common neurodegenerative diseases in the elderly and one of most the geriatric health challenges of the 21st century(Kivipelto, Mangialasche, and Ngandu 2018) Long-term disability not only has a significant impact on patients, but it also has a social and human cost for caregivers and society as a whole(Yeh, Wang, and Ku 2020). The early reviews by Armstrong concluded that the major risk factors for AD are age, family history and genetics, diet, and lifestyle, traumatic brain injury, and associated co-morbidities such as vascular disease, infection, obesity, and diabetes(A Armstrong 2019). Since the number of patients with AD is likely to rise, identifying ways to prevent and reduce the risk of developing the disease is essential. Individual activities and lifestyle choices have the potential to influence health and improve quality of life as well as increase or decrease an individual's risk of developing AD (Kivipelto, Mangialasche, and Ngandu 2018). Lifestyle is proposed as one of the important determining elements in people’s general health, globally(Egger, Binns, and Rossner 2009). According to the public health perspective, promoting healthy lifestyle behaviors is a practical strategy that is anticipated to have a strong influence on dementia and cardiovascular disease prevention(Dhana et al. 2020).

A variety of protective variables have been found, including lifestyle behaviors and cardiovascular diseases, that each contribute to a lower risk of cognitive decline and Alzheimer's disease(Dhana et al. 2020). The result of a study by Dhana and colleagues in 2020 demonstrated that a healthy lifestyle is associated with a substantially lower risk of AD and dementia(Dhana et al. 2020). Hope is defined as the perception of one's ability to identify ways to achieve desired outcomes. The hope theory is compared to theories of learned optimism, optimism, self-efficacy, and self-esteem. Higher hope is consistently related to better outcomes in academics, athletics, physical health, psychological adjustment, and psychotherapy(Inquiry and Snyder 2020). To improve survival and extend the longevity of life for all populations, healthcare professionals should have a

comprehensive knowledge of how to utilize one of the most essential variables in determining a society's cultural, social, economic, and health condition which is life expectancy scale (Shalkouhi, Vatankhah, and Bahri 2015). According to one study, at 65 years old, happy life expectancy is nearly 25% longer than cognitively intact life expectancy, and at 85 years old, happy life expectancy is approximately twice cognitively intact life expectancy. Happiness does not need the absence of cognitive disability, in other words, even if a person's cognitive abilities are diminished, they can enjoy a great quality of life(Bardo and Lynch 2021). As total life expectancy is increasing globally, due to poor diets and bad lifestyles, the prevalence of age-related disorders such as diabetes and Alzheimer's disease is on the rise (Agatonovic-Kustrin, Kustrin, and Morton 2019). The aim of this study was to evaluate the reliability and validity of the lifestyle and life expectancy questionnaires in the Italian setting in order to make this instrument available for the determination of lifestyle and hope level in the different domains of everyday life.

Method

Data and Sample

This cross-sectional study was conducted using data from Alzheimer's patients in the Sapienza university of Rome teaching hospital, policlinico Umberto 1, under the supervision of Professor Evaristo Ettorre in Rome, Italy from July to September 2021. Inclusion criteria in the present study include eighteen patients over 60 years old, non-smoking, and non-use of certain medications (depression, anxiety, and hypnotics). lifestyle and life expectancy questionnaires were completed by patients. Among them, 6 (33.30%) are men and 12 (66.70%) women. The respondents' age ranged from 62 to 91, with a mean age of around 79 (SD = 8.91). (see Table 1).

Questionnaires

The original versions of the two questionnaires, lifestyle (*Miller-Smith*) and life expectancy (*Schneider*), were translated into the Italian language (Appendix A, B)(Lifestyle and Inventory n.d.),(Schneider et al. 2005), by an expert translator, and two psychologists who are proficient in both languages reviewed the items to agree on the final version used in the present study.

The lifestyle questionnaire is proposed as one of the important determining elements in people's general health, globally. Miller-Smith Lifestyle Assessment Inventory consists of 20 items with a 5-point Likert-type scale that asks respondents how often the related items are apply to them. It was used to assess the lifestyle of Alzheimer patients, including exercise, sleeping, spirituality, social relations, overall health status, weight, nutrition, smoking and affection. Response choices range from 1 (always) to 5 (never). Total scores range from 20 to 100 (Lifestyle and Inventory n.d.). Scores of the statement of each component were summed up, converted into percent scores, and the total was divided by the number of the items, giving a mean score for each component. The respondent's lifestyle was considered excellent/healthy if the total score was less than 50%, very good/moderate 50% - 70 %, good/Mild 70% - 95%, and unhealthy/poor if the score was > 95%. Miller and Smith (1988) reported the reliability as α=0.85. The AMOS (version 22.0, Chicago: IBM SPSS) was applied to analyze research data by structural equation models ($P<0.001$).

Schneider's Life Expectancy Questionnaire consists of 12 items and aims to assess the level of life expectancy in individuals. The statements of the questionnaire include 4 statements for measuring agency thinking, 4 for strategic thinking and 4 as deviant statements. So, it consists of two sub-scales: agency and strategy. This questionnaire assesses the two dimensions of life expectancy: (1) the energy for achieving goals in life; and (2) the personal plan for achieving goals in life. The scoring is based on a 5-point Likert scale, from 1 (totally disagree) to 5 (totally agree). Sum of strategy and factor subscale scores determines the total score of hope. Preliminary evidence about the validity of the test is provided by Schneider et al. (Schneider et al. 2005). Cronbach's alpha is between 74% and 84% and reliability is calculated 80% over a period of 10weeks (Asqari and Donyavi 2018). Many researchers have supported the validity and reliability of the questionnaire as a measuring scale. The internal consistency range of the test has been reported 0.74-0.84 and the validity of test-retest 0.80, while for the time period beyond 8-10 weeks, those figures would be higher (Shalkouhi, Vatankhah, and Bahri 2015).

Statistical analysis

Two separate types of analyses were performed to validate the Italian version of the questionnaires: one for Lifestyle and the other one for the Life Expectancy. The lifestyle and life expectancy Scale was evaluated for its validity. Internal consistency was considered to assess the reliability of the results across items within the adopted scale by using Cronbach's α coefficient. A reliability analysis was performed to check whether any item was inconsistent with the rest of the scale and could thus be discarded. The item-total correlation and the variability of the alpha between items were tested by adding and eliminating items one at a time. To describe the sample, frequency tables were compared, using percentage for categorical variables and mean and standard deviation (SD) for quantitative ones. Using Kolmogorov-Smirnov's test, the normality distribution was evaluated to guarantee the applicability of a parametric or non-parametric test. The software used to analyze data was SPSS 26 for Windows.

Result

Eighteen of the lifestyle and life expectancy questionnaires were completed and submitted on time by each participant. Table 1 shows the descriptive statistics and self-reported questionnaire in which the only requested socio-demographic characteristics were age, gender, educational level, and marital status. Among them, 6 (33.30%) were men, and 12 (66.70%) women. The respondents have an age range from 62 to 91, with a mean age of around 79.16 (SD = 8.91) (Table 1). The target population of the study was Alzheimer's patients in the Sapienza University of Rome teaching hospital, Policlinico Umberto 1 in Rome, Italy. They were mainly female with an elementary educational level (44.40%) and were married (61.10%) (Table 1). The mean of the total lifestyle scale was 51.66±12.02, and the mean life expectancy was 35.88±10.80 (Table 2,3).

Internal consistency was assessed for the entire instrument as well as for each subscale. The lifestyle scale showed high overall internal consistency. The Cronbach's α coefficient for the total 20-item scale was 0.80 (see Table 2), which is near the original value of 0.85 for the English language version reported by Miller and Smith (1988)(Lifestyle and Inventory n.d.). The result of Cronbach's alpha in the lifestyle questionnaire proved that the elimination of each question had no positive effect on improving the alpha form.

The Cronbach's alpha demonstrated that using the questionnaires on all 12 items concerning life expectancy demonstrated high overall internal consistency that was 0.93, and removing each item had no influence on the alpha form. The reliability analysis is shown in Table 3.

Discussion

There is a need to regularly assess the current lifestyle of patients with AD to see if there are factors in it that may be increasing their vulnerability to stress and may reduce their life expectancy, and which could be suitable targets of change. The purpose of this research was to measure the reliability and validity of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires in an Italian setting, with the goal of making these instruments available for determining lifestyle and hope levels in various domains of daily life in the Italian population. So far, Iranian researchers have primarily used the Miller-Smith lifestyle assessment inventory to investigate the relationship between stress and lifestyle, and it has demonstrated good psychometric properties in Iranian studies(Ghorbani Taghlidabad and Tasbihsazan Mashhadi 2018),(Abedini Baltork and Mir Shamsi 2019). On the other hand, the Schneider life expectancy scale, has been validated for the Iranian population, with Cronbach's alpha coefficients of 0.73 and 0.75 for the pathways and agency domain, respectively(Shegefti and Samani 2011). According to the outcome of our statistical analysis, the lifestyle scale showed high overall internal consistency, and the Cronbach's α coefficient for the total 20-item scale was 0.80 in the Italian population, which is slightly more reliable than similar validation in an Egyptian population. A team of researchers from the medical surgical nursing department at the faculty of nursing at Ain-Shams University, Cairo, Egypt tested the reliability of the lifestyle questionnaire among 50 patients with chronic obstructive pulmonary disease, and the Cronbach's α coefficient for the total 20-item scale was 0.698 for the Egyptian population (Gomaa, Mohamed, and Morad 2020). According to the outcome of our statistical analysis, using the 12-item questionnaire about life expectancy resulted in a high overall internal consistency of 0.93, according to the Cronbach's alpha test, and deleting each item had no effect on the alpha form. Similarly, the test for the validity of the lifestyle expectancy/hope scale among Iranian high school students demonstrated that the scale has appropriate psychometric qualities to be used in Iran, the Cronbach's Alpha test showed 0.66 for agency and 0.80 for pathways (Yailagh et al. 2012). Exercising, eating a Mediterranean diet, avoiding stress, quitting smoking, reducing the intake of saturated fats and trans fats, increased intake of vegetables, legumes (beans, peas, and lentils), fruits, and whole grains and treating illnesses like diabetes, hypertension, and atherosclerosis can all assist to reduce the risk of AD and extend life (Barnard et al. 2014). Moreover, free radicals are thought to play a role in the etiology

of AD, according to several studies. Many Alzheimer's patients had mitochondrial and nuclear DNA damage and oxidation (Wojtunik-Kulesza et al. 2016). Furthermore, antioxidants and free radical scavengers have been demonstrated to lower amyloid toxicity in AD patients, raising therapeutic expectations for their usage. Vitamin E (tocopherol), Selegiline (monoamine oxidase inhibitor), and Ginkgo biloba extract (EGb 761) are free radical scavenging supplements that have shown promise in the management of AD (Wojtunik-Kulesza et al. 2016). According to one study, patients with dementia of any kind have a greater death rate than individuals who do not have dementia. Individuals with AD had a median survival time of 5–8 years after diagnosis (20). A diagnosis of any non-disease Alzheimer's dementia was associated with a higher risk of all-cause mortality, a shorter survival time from diagnosis, and a younger age of death when compared to individuals with Alzheimer's disease. Individuals with non-dementia Alzheimer's had lower survival times across all types of dementia than people with AD, but the subgroup analysis revealed that this difference was only significant for vascular dementia and dementia with Lewy bodies(Liang et al. n.d.). In order to develop health promotion strategies towards improving the quality of life among Italian patients with AD, their lifestyle behaviors and life expectancy should be periodically checked and analyzed using the appropriate validated questionnaires.

Table 1. Descriptive statistics for survey participants

socio- demographical variables		***N***	***valid percent***	***(Mean ± SD)***
Gender	Men	6	33.30	-
	Female	12	66.70	
Age(Year)		18(62-91)	-	**(79.16±8.91)**
Educational level	Elementary	8	44.40	-
	High school	3	16.70	
	Diploma	6	33.30	
	Degree	1	5.60	
Marital status	Married	11	61.10	-
	Divorce	1	5.60	
	Single	0	0	
	Widow	6	33.30	

Table 2. Lifestyle questionnaire version. Statistical description and univariate analysis. Item-total correlation and validity of Cronbach's alpha, if one item was deleted

Questionnaire	*N*	*Mean (SD)*		*corrected Item-Total correlation*	*Cronbach's Alpha if Item Deleted*
I smoke less than half a pack of cigarettes a day(non – smokers score 1)	18	2.11	(±1.87)	0.140	0.816
I am in good health (including eyesight ; hearing; teeth).	18	3.11	(±1.27)	0.24	0.80
I am the appropriate weight for my height.	18	2.44	(±1.09)	0.58	0.78
I exercise to the point of perspiration at least twice a week	18	4.27	(±1.63)	0.44	0.79
I eat at least one hot; balanced meal a day.	18	2.61	(±1.33)	0.36	0.79
I drink fewer than three cups of coffee (or tea or coke) a day.	18	2.05	(±1.30)	0.26	0.80
I get seven to eight hours sleep at least four nights a week.	18	2.83	(±1.29)	0.22	0.80
I regularly attend club or social activities.	18	3.33	(±1.57)	0.74	0.76
I do something for fun at least once a week.	18	3.33	(±1.49)	0.72	0.77
I give and receive affection regularly.	18	1.61	(±1.14)	0.09	0.80
I have a network of friends and acquaintances.	18	2.83	(±1.20)	0.66	0.78
I have at least one relative within 50 km on whom I can rely.	18	1.50	(±0.98)	-0.02	0.81
I have one or more friends to confide in about personal issues.	18	3.11	(±1.56)	0.73	0.77
I have regular conversations with the people I live with about domestic problems e.g., chores; money and daily living issues.	18	2.72	(±1.44)	0.60	0.78
I am able to speak openly about my feelings when angry or concerned	18	2.50	(±1.42)	0.48	0.78
I get strength from my religious beliefs; or I feel comfortable with my view of the universe and my place in it.	18	2.16	(±0.85)	0.11	0.80
I take quiet time for myself during the day.	18	2.61	(±1.14)	-0.27	0.82
I am able to organize my time effectively.	18	3.33	(±1.08)	0.65	0.78
I have an income adequate to meet my basic expenses.	18	1.66	(±1.02)	0.27	0.80
I take fewer than five alcoholic drinks a week (non- drinkers score 1).	18	1.50	(±0.85)	0.23	0.80
Total item(20)	**-**	**51.66**	**(±12.02)**	***0.80***	

Table 3. Life expectancy questionnaire version. Statistical description and univariate analysis. Item-total correlation and validity of Cronbach's alpha, if one item was deleted

Questionnaire	*N*	*Mean (SD)*		*corrected Item-Total correlation*	*Cronbach's Alpha if Item Deleted*
I can think of many ways to get out of a jam.	18	3.11	(±1.23)	0.81	0.92
I energetically pursue my goals.	18	3.27	(±1.48)	0.92	0.92
I feel tired most of the time.	18	3.00	(±1.18)	0.77	0.92
There are lots of ways around any problem.	18	3.16	(±1.15)	0.85	0.92
I am easily downed in an argument.	18	3.16	(±1.33)	0.67	0.93
I can think of many ways to get the things in life that are important to me.	18	3.05	(±1.16)	0.58	0.93
I worry about my health.	18	2.66	(±1.18)	0.75	0.92
Even when others get discouraged, I know I can find a way to solve the problem.	18	3.38	(±1.09)	0.30	0.94
My past experiences have prepared me well for my future	18	3.16	(±1.15)	0.90	0.92
I've been successful in life	18	3.05	(±1.21)	0.64	0.93
I usually find myself worrying about something.	18	1.77	(±0.54)	0.79	0.93
I meet the goals that I set for myself	18	3.05	(±1.16)	0.69	0.93
Total item (12)	**-**	**35.88**	**(±10.80)**	***0.93***	

Appendix A

The questionnaire to assess Lifestyle

	Domanda	sempre	di solito	a volte	raramente	mai
1	Fuma meno di mezzo pacco di sigarette al giorno (non fumatori punteggio 1)					
2	Gode di buona salute (compresi vista, udito, denti)					
3	Ha il peso appropriato per la mia altezza					
4	Pratica esercizio fisico fino alla sudorazione almeno due volte a settimana					
5	Mangia almeno una porzione di carne cotta ed equilibrata al giorno					
6	Beve meno di tre tazze di caffè (o tè o Coca-Cola) al giorno					
7	Dorme dalle sette alle otto ore almeno quattro notti a settimana					
8	Partecipa regolarmente ad attività sociali					
9	Pratica attività che lo divertono almeno una volta a settimana					
10	Da e riceve affetto regolarmente					
11	Ha di amici e conoscenti che frequenta					
12	Ha un parente che gli abita vicino (entro i 50 km) su cui poter contare					
13	Ha uno o più amici a cui confidare problemi personali					
14	Ha regolari conversazioni con le persone con cui abita su argomenti a carattere domestico (per esempio, faccende domestiche, soldi, problemi di vita quotidiana, fare la spesa, ecc.)					
15	È in grado di parlare apertamente dei sentimenti quando è arrabbiato o interessato					
16	È una persona religiosa e trae forza da questa, o si sente comunque a proprio agio con la visione dell'universo					
17	Ha momenti in cui sta in silenzio durante il giorno					
18	È in grado di organizzare il tempo in modo efficace					
19	Ha un reddito adeguato a far fronte alle spese di base					
20	Beve alcol meno di cinque volte a settimana					

Appendix B

The questionnaire to assess Life expectancy

	Domanda	in completo disaccordo	in disaccordo	incerto	d'accordo	completamente d'accordo
1	Riesco a pensare a molti modi per tirarmi fuori dai guai.					
2	Perseguito energicamente i miei obiettivi.					
3	Mi sento stanco la maggior parte del tempo					
4	Ci sono molti modi per aggirare qualsiasi problema.					
5	Sono facilmente abbattuto in una discussione.					
6	Posso pensare a molti modi per ottenere le cose nella vita che sono importanti per me					
7	Sono preoccupato per la mia salute.					
8	Anche quando gli altri sono scoraggiati, so che posso trovare un modo per risolvere il problema.					
9	Le mie esperienze passate mi hanno preparato bene per il mio futuro.					
10	Ho avuto abbastanza successo nella vita.					
11	Di solito mi trovo a preoccuparmi di qualcosa.					
12	Ho incontrato gli obiettivi che mi sono prefissato.					

Chapter 4

Efficacy of the Curves Training Program for Loosing Body Weight, Body Circumferences and Fat Mass Percentage

Non-Randomized Clinical Trial

Efficacy of the curves training program for loosing body weight, body circumferences and fat mass percentage: a non-randomized clinical trial[*]

Abstract

purpose: Hypokinesia is the fourth cause of endemic death in the world. The prevalence of obesity, caused by hypokinesia, in the world continues to increase and it is the main risk factor of chronic diseases. Our aim was to evaluate the effectiveness of the curves program and High-Intensity Interval Training in healthy women.

Methods: The study design is a non-randomized clinical trial. Eighty women with age between 30 to 40 years (who train 3/4 times a week) participated over a period of six months. They were allocated into a "Curves" program group (n = 40) and a "High-Intensity Interval Training" group (n = 40). BMI, body fat, the fat mass percentage were calculated by OMRON body fat 306 TM at baseline and the end of the intervention.

Results: The results between high-intensity interval training and curves show that curves scores were significantly lower among Interval training. after 6 months the most impact was on "Abdomen loss "in Curves Group Mean(SD) = -4.48(1.70). According to the multivariate analysis, we can say that for all the dependent variables Weight loss -0.320 (P <0.001), Trunk loss -0.376 (P <0.001), Abdomen loss -0.276 (P <0.001), Hip loss -0.302 (P<0.001), Lower arm loss -0.248 (0.003) and Fat mass loss -0.153 (0.061) the curves group shows significant results in comparison with the high-intensity interval training group ($p < 0.001$) while the civil status is significantly associated with only "Upper arm loss" variable ($\beta = -0.357$; $p <0.001$).

Conclusions: This "Curves" program improved strength muscles, loss of fat, and fat mass reduction more than High-Intensity Interval Training.

[*] Cilindro, C., ***S. Gholamalishahi***, G. La Torre, and D. Masala. 2019. "Efficacy of the Curves Training Program for Loosing Body Weight, Body Circumferences and Fat Mass Percentage: A Non Randomized Clinical Trial." Clinica Terapeutica 170(4).

Introduction

Obesity is an epidemic globally and one of the main risk factors of chronic diseases, including type 2 diabetes, hypertension, cardiovascular diseases, and stroke(Apovian and Riffenburg 2017),(Mukhra et al. 2018). Obesity is associated with metabolic and hormonal profiles and it is the major cause of breast cancer (Andò et al. 2019). The prevalence of obesity and overweight in the world continues to increase (Wilborn et al. 2005),(Pancallo et al. 2015). 1.2 billion people in the world are overweight and 300 million of them being obese (Wilborn et al. 2005),(Pancallo et al. 2015). The relationship between abdominal obesity and waist circumference (WC) to cardiovascular risk is well established and there is a very high correlation between BMI and WC(Ahima and Lazar 2013). The promotion of physical activity has been widely faced with children (Pancallo et al. 2015) and few studies are present in the adult population. Physical activity has positive effects on weight management and changes of hormones in fat metabolism and cardiovascular disease risk and it is an important way to battle obesity(Mirghani et al. 2019). There is evidence that physical exercise is efficacious in reducing chronic diseases(Zhang et al. 2020)(Jin et al. 2017). Previous studies clearly report that especially high-intensity interval training (HIIT) is an efficient protocol that reduction obese(Mirghani et al. 2019). Interval training is a popular training method used by young individuals to improve certain physiological and fitness variables (Huang et al. 2016). It is determined by relatively high-intensity repetitions of physical activities that are interspersed with periods of rest for recovery (Huang G et al, 2016). The specific interval training variables – distance, intensity, and rest time between intervals – are determined according to the individuals' specific needs (Huang G et al, 2016). Recent evidence shows that (HIIT) can generate changes in body composition and body weight (Mirghani et al. 2019). The Curves fitness and weight loss program has become a very popular means of promoting health and fitness among women (Kerksick et al. 2009). Curves International is currently the largest fitness franchise in the world with over 4 million members in 10,000 clubs in over 69 countries. The typical curves member is a 30 – 60-year-old sedentary female who ranges from being slightly overweight to obese according to BMI standards(Kreider et al. 2004) . The program involves a 30-minute circuit training program and a weight management program involving periods of moderate caloric restriction (1,200 to 1,600 calories per day) followed by short periods of higher caloric intake

(2,600 calories per day). The program is designed to promote a gradual reduction in body fat while increasing strength and fitness (Kreider et al. 2004).

The aim of this study is to assess the efficacy of the loss of weight, waist circumference, and fat mass reduction of curves program training compared to high-intensity interval training in healthy women with ages between 30-40.

Method

Study design

The study design is a non-randomized clinical trial of the effects of curves training vs high-intensity interval training reducing body weight, body circumferences, and fat mass percentage. In curves, there is always an instructor in the circuit, to assist women in training and to motivate them. They are never alone. Furthermore, once a month the instructors update the personal data sheet taking the weight, body measurements, and values of fat mass and lean mass, to have a more detailed view of the progress.

Setting

The trial will involve 80 physically active women aged 30 to 40 (who train 3/4 times a week) over a period of six months. The study will include the involvement of Dr. Graduates in Sports Science, who constantly supervised the work and guided the client in the execution of each individual movement. The training sessions are held inside the curves club in Cassino, Italy. The clubs are open Monday to Friday from 9.00 a.m. to 8 p.m., allowing members to train every day, based on their availability. Type of training FIRST GROUP: 40 women participated in a 6-month Curves Training Program training 3 times a week.

SECOND GROUP: 40 women participated in High-intensity interval training classes for 6-months, 3 times a week.

FIRST GROUP: Subjects participated in a supervised 30-min resistance training circuit program. The workout is complete with warm-up, strength training, cardio workout, cool down, and stretching. The Curves circuit is made up of 13 tools, which represent the ideal combination for a targeted full-body workout for arms, abdomen, and legs. Every 30 seconds you change the station, and this allows you to recover and train different muscle groups but keeping the heart rate within the established intensity zone. The heart is a muscle that has to do a job to become strong and stay strong. Cardiovascular training is achieved with enough fatigue to raise the heart rate to the target training level. The machines we use provide the effort required to raise the beat to its target level.

Keeping the workout "in the right area" ensures that you are exercising in the ideal training zone. Exercising in the target heart rate band ensures a cardiovascular benefit at a safe level but is still effective. The final 30-minutes of the training component is characterized by five minutes of concentrated stretching. Stretching helps increase the range of movement and circulation. It is necessary to help increase and maintain flexibility, a key component for optimal health. By correctly and regularly stretching the muscles, you help to maintain joint integrity, avoiding back pain, and, as studies show, significantly improving efforts and weight loss.

SECOND GROUP: The three phases of the lesson. The typical high-intensity interval training workout lesson takes place this way. Heating (about ten minutes): it starts with a march on the spot to which shoulder rotations are added; then alternate side steps are made with the synchronized opening of the arms at shoulder level; you end up with hops in place, alternately raising your knees towards your chest. Training (about 40 minutes): there are a series of exercises to train the legs, arms, abdomen, and back muscles. The (HIIT) focuses on short and high-intensity intervals, alternating effort, and recovery phases.

– Stress phase: Stress at the limit for 30 - 60 seconds

– Recovery phase: An active pause follows which can last from two to three times the previous effort phase.

Relaxation (about 10 minutes): stretching exercises are done giving particular emphasis to the stretching of the muscles most stressed by the exercises of the day.

Physical fitness assessment tools are used, such as the OMRON body fat 306 TM for the calculation of BMI, body fat; The OMRON is an electronic device that allows the determination with the precision of the fat mass in the body (body fat), through a bioelectrical impedance analysis (BIA) measurement (bimolecular impedance). The device has a double handle to be gripped with each hand, it will be sufficient to provide the required data (height, weight, age, male or female) and press a button to know in a few seconds your own percentage of fat and the weight of fat in the body.

– Measure the percentage of fat mass in the body

– Calculate the body mass index (BMI)

– Measurement is approximately 7 seconds

– Graphic indication of Fat Mass and Body Mass values (according to the parameters of the World Health Organization)

– Clinically validated

– Small, light, and portable

The measurement is fast and simple. After setting the data, the body fat mass will simply be measured by holding the electrodes and pressing the start button. The measured results are displayed in about 7 seconds. Conditions and circumstances are NOT suitable for a correct measurement. If a measurement is made in the presence of the following physical condition, the percentage of body fat measured could vary considerably from the actual one, since the water content in the body changes during the day:

– Immediately after intense physical activity

– Immediately after having made a bath or a sauna

– After drinking alcohol

After drinking an abundant drink amount of water or after a meal (1-2 hours) Moreover, the measuring tape will be used for the measurement of the chest, abdomen, hips, thighs, arm circumferences. In detail:

– Chest: Measure the circumference by placing the measuring tape measure in line with the nipples.

– Abdomen: Measure the circumference, placing the measuring tape one cm above the navel.

– Hips: Measure the circumference with the legs closed, in the most prominent part of the buttocks.

– Arm: With the palm facing forward and the arm extended, measure the mid-point between the shoulder and elbow.

– Leg: Measure the circumference just below the gluteal fold, i.e., at the beginning of the limb. In addition, one was used a professional scale to periodically record your weight.

Statistical analysis

The following variables were considered as an outcome measure: Weight loss; Trunk loss; Back-loss; Abdomen loss; Hip loss; Lower arm loss; Upper arm loss; Fat mass loss.

Differences between the two groups were assessed using the student t-test and chi-square test for quantitative and categorical variables, respectively. Finally, a multiple regression analysis was carried out for adjusting the analysis of the univariate analysis also considering the following covariates: Age; civil status; the number of training sessions.

The results are presented as beta coefficients (p values). The goodness of fit of the models was assessed using the R2 value. The statistical analysis was carried out using the software SPSS for Windows, release 25.0. The statistical significance was set at ($p < 0.05$).

Results

The trial is reported according to the CONSORT statement (Fig. 1). 80 women entered the study, 40 in the Curves group and 40 in the High-intensity interval training group. Table 1 shows a basic descriptive statistic and baseline characteristics and a total number of participants in the High-intensity interval training group (N= 40) with" age" Mean (SD)= 31.0 (8.7) and Curves group(N=40) with" age "Mean (SD)= 39.5 (10.8). Most participants in Curves group were" Employed "Mean (SD)= 26(65) and" Single/Divorced "Mean (SD)= 21 (52.5). The result represents High-intensity interval training score was relatively low except only in "Housewives/student "Mean (SD)= 20 (50), "Married/cohabitant "Mean (SD)= 26 (65), and" Weight" Mean (SD) = 66.43(9.53). The Univariate analysis (Table 2) comparing the results between High-intensity interval training and curves show that Curves scores were significantly lower among Interval training. After 6 months the most impact was on "Abdomen loss "in Curves Group Mean (SD) = -4.48(1.70). In the Curves group "Weight loss" scored (p =0.219) and "Upper arm loss" (p=0.10) insignificant higher than Interval training.

According to the multivariate analysis (Table 3), we can say that for all the dependent variables the Curves group shows significant results in comparison with the High-intensity interval training group ($p < 0.001$ for all the models). The civil status is significantly associated with only "Upper arm loss" variable ($\beta = -0.357$; $p < 0.001$), while the Number of trainings is significantly associated with all the dependent variables, except for "Back-loss", "Upper arm loss" and "Fat mass loss".

Discussion

Physical activity is worldwide recognized as a tool for improving health in a different setting (Mannocci et al. 2016) and is an important instrument for weight control/reduction if compared to diet alone(Pancallo et al. 2015), (La Torre et al. 2016). The research is a pilot study that investigates the difference between two training systems carried out in the gym, dedicated exclusively to women: "Curves" and "Interval Training", resulted in the first method being more effective than the second, is more intense, and more individually followed. For the time that is used in the commitment (of 30'), the results can be defined as satisfactory.

There are few randomized controlled trials that concurrently consider the relationship between curves training and loos of weight. Jin S et al reported that gut microbiota is associated with obesity-related disorders such as adiposity, insulin resistance, dyslipidemia, and the data analysis displayed the positive effect of curves exercise on gut microbiota especially endotoxin (Jin S et al,2017). Negaresh R et al demonstrated that exercise (Short Term Interval Training) is an effective therapeutic intervention for improving fatigue, depression, and functional parameters, independent of initial weight status in person with Multiple Sclerosis(Negaresh et al. 2019) 2019). The results of Kerksick C et al indicated that combining a diet with a resistance exercise program stimulates the greatest amount of weight loss and improvements in measures of body composition (Kerksick C et al, 2009). In some studies, has been shown that orderly participation in resistance exercise program cause losses of body mass, improvements in cardiovascular, musculoskeletal fitness, and health-related quality of life (Kerksick C et al 2009),(Arija et al. 2018). There is strong evidence that physical activity is a determining factor in the reduction and maintenance of a healthy weight, with greater benefits being observed when it is upper 150 min/week (physical activity guidelines committee scientific report, 2018). Arija Vrija and colleagues represented the relationship between physical activity (PA) and health-related quality of life (HRQoL) (Arija V et al, 2018) and the result was the same with Battaglia G et al.They found a positive relationship between aerobic PA programs and (HRQoL) (Battaglia et al. 2016) while other studies that were not supervised with high levels of aerobic PA (Imayama et al. 2011) or with high intensity did not report any benefit on HRQoL (Chin 2004),(Conradsson et al. 2010).

Strengths: the study led to the conclusion that the "Curves" training is above all more suitable for people who have physical problems, working with hydraulic machinery and therefore with

isokinetic muscle contractions. In terms of timing, it is relatively more effective. Furthermore, the training is more followed by specialized personnel, having few subjects to follow, compared to the other, enhancing individuality. The T. Instead has more positive the situation of sociality that develops among the users, even if the results are less effective. The 2 methods are similar; they are both intense but the second + heavy (not suitable for people with trauma).

Weaknesses: Plyometric measures were not taken in the pilot study. The sample is not randomized, but the subjects are all prepared for enrolment in the courses. Even the ages of the subjects are too different by not allowing one.

Conclusion: Curves (strengthens muscles and burns fat, abdomen reduction) is in terms of absolute values better than IT.

The trial is reported according to the CONSORT statement (figure 1).

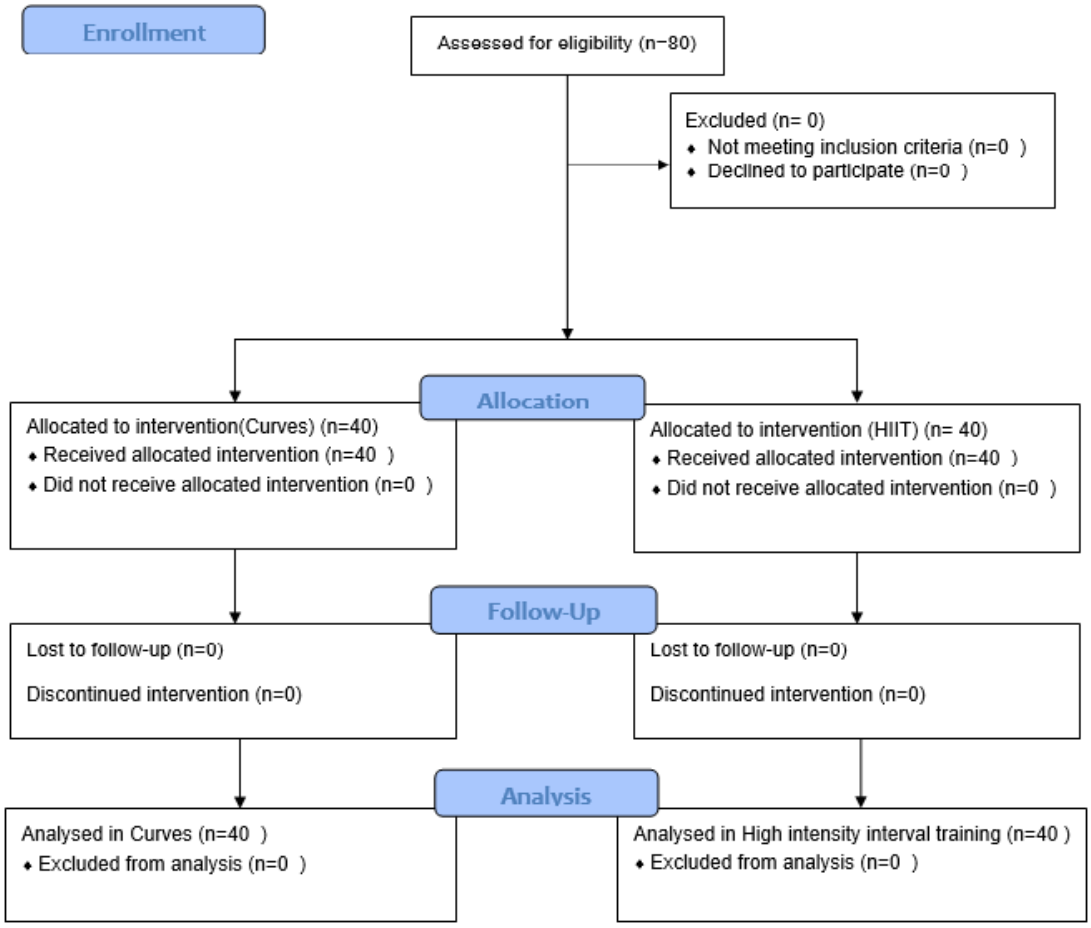


Table 1 – Characteristics of the sample

Variables	Interval training Mean(SD) or n(%)	Curves Mean(SD) or n(%)	p
N	**40**	**40**	**-**
Age	31.0 (8.7)	39.5 (10.8)	**< 0.001**
Work			
Employed	20(50)	26(65)	0.175
Housewives/student	20(50)	14(35)	
Marital status			
Married/cohabitant	26 (65)	19 (47.5)	
Single/Divorced	14 (35)	21 (52.5)	0,115
Training sessions	84.6 (9.8)	84.8 (8.7)	0.510
Weight at T0 (Kg)	66.43(9.53)	65.09(12.55)	0.057
BMI at T0	24.34 (3.62)	23.22 (4.46)	0.222

Table 2 – Univariate analysis comparing the results between the two groups

Variables	Interval training Mean(SD)	Curves Mean(SD)	p
Weight loss (Kg)	-1.66(0.57)	-3.14(0.94)	0.219
BMI reduction (Kg/height^2)	-0.61 (0.21)	-1.13 (0.36)	**<0.001**
Trunk loss (cm)	-2.39(0.73)	-4.06(1.46)	**0.001**
Back--- loss (cm)	-2.53(0.77)	-3.93(1.35)	**0.018**
Abdomen loss (cm)	-1.99(0.62)	-4.48(1.70)	**<0.001**
Hip loss (cm)	-1.93(0.95)	-4.23(1.56)	**0.001**
Lower arm loss (cm)	-2.00(0.60)	-3.89(1.40)	**<0.001**
Upper arm loss (cm)	-2.17(0.65)	-2.65(0.83)	0.10
Fat mass loss (%)	-2.07(0.58)	-3.47(0.84)	**0.02**

Table 3 – Linear multivariate analysis of several dependent variables, according to type and number of training and civil status

Variables	Curves vs Interval training	Married or cohabitant vs Single/divorced	Number of trainings	R^2
	β (p)	β (p)	β (p)	
Weight loss	**-0.689 (P<0.001)**	-	**-0.320 (P<0.001)**	*0.582*
Trunk loss	**-0.586 (P<0.001)**	-	**-0.376 (P<0.001)**	*0.489*
Back--- loss	**-0.539 (P<0.001)**	-	-	*0.290*
Abdomen loss	**-0.759 (P<0.001)**	-	**-0.276 (P<0.001)**	*0.560*
Hip loss	**-0.751 (P<0.001)**	-	**-0.302 (P<0.001)**	*0.542*
Lower arm loss	**-0.635 (P<0.001)**	-	**-0.248 (P<0.003)**	*0.493*
Upper arm loss	**-0.357 (P<0.001)**	**-0.267 (P<0.014)**	-	*0.143*
Fat mass loss	**-0.693 (P<0.001)**	-	-0.153 (P≥0.061)	*0.497*

Chapter 5

Effects of Tai Chi and Qigong on Fatigue and Quality of Life among Patients with Breast Cancer

An Umbrella Review of Systematic Reviews and Meta-Analyses

Effects of Tai Chi and Qigong on fatigue and quality of life among patients with breast cancer: An umbrella review of systematic reviews and meta-analyses

Abstract

Background

Tai Chi and Qigong are mind-body practices that may mitigate a range of physical health and psycho-social problems that are prevalent in supportive cancer care. Slow/gentle movement, awareness, and regulation of breathing, as well as conscious direction of thoughts, attention, images, and sensations are involved in Tai Chi.

Objectives

The objective of this review was to evaluate the effects of Tai Chi and Qigong on quality of life and fatigue among patients with breast cancer.

Methods

Three electronic English medical databases (PubMed, Scopus, and Web of Science) were systematically searched from their inceptions up to July 2021. Population (patients with breast cancer) Intervention (Tai Chi and Qigong) Comparison (No intervention) Outcome (Measures of cancer-related fatigue and quality of life) framework was used to identify and select the papers.

Results

Nine systematic reviews and meta-analyses were included in this umbrella review. 3 systematic reviews and meta-analyses reported the effects of Tai Chi and Qigong on cancer-related fatigue among patients with breast cancer. 4 studies reported the effects of Tai Chi and Qigong on quality of life among patients with breast cancer. Whereas 2 studies reported the effects of Tai Chi and Qigong on both cancer-related fatigue and quality of life. The quality of the reviews varied; however, most of the studies scored 6/11 and slightly above when evaluated using the measurement tool to assess systematic reviews, indicating moderate quality evidence. One study involving 1461 adult patients with any type of cancer, including breast cancer, reported that Tai Chi significantly decreased fatigue among these patients. Another study involving 1268 patients

with breast cancer stated that when Tai Chi is combined with Qigong and walking, it significantly reduces fatigue. Moreover, another study involving 1571 cancer survivors stated that Tai Chi combined with Qigong significantly reduced fatigue, indicating that Tai Chi combined with Qigong may be more effective in mitigating cancer-related fatigue. A study involving 950 patients with breast cancer showed that engaging in Qigong had a significant impact on quality of life among patients with breast cancer, whereas most of the studies showed no significant evidence that Tai Chi and/or Qigong could improve the overall quality of life among patients with cancer.

Conclusion

Tai Chi and Qigong have shown potential as supportive therapies in the treatment of cancer-related fatigue and improving the quality of life among patients with breast cancer. However, there is moderate evidence indicating that Tai chi and Qigong reduce fatigue and improve health-related quality of life among patients with breast cancer. Therefore, further research studies regarding this subject matter are likely to have a significant impact in the future.

Introduction

Tai Chi (TC) has been shown to be like conventional supportive care therapies in terms of reducing fatigue and depression and improving quality of life (QoL) and sleep quality among patients with breast cancer (BC)(L. Liu et al. 2020). Qigong is a self-directed exercise that incorporates meditation and breathing patterns(Hung, Hwang, and Chang 2021). The gentle motions and postures of the exercise are designed to improve physical fitness and overall well-being by achieving a balanced flow of energy throughout the body(Hung, Hwang, and Chang 2021). TC is a slow-motion exercise that incorporates relaxation, deep and regulated breathing techniques, and slow motions. Traditional TC incorporates qigong, and in fact, qigong is an essential component of TC.

Cancer therapies can result in severe long-term discomfort, which can impair QoL(Luo et al. 2020). Fatigue is a common complaint among patients with cancer and has been associated with surgery, chemotherapy, and radiotherapy(W. Zheng et al. 2016). Furthermore, cancer-related fatigue may impair a patient's capacity to complete routine therapies, affecting standard medical care and perhaps lowering overall survival rates(Yin, Tang, and Dishman 2020). Treatment for fatigue in women with BC is thought to have a strong and clinically significant relationship with depression and anxiety. Fatigue treatment has been shown to have a significant negative impact on QoL, including social, psychological, functional, and even financial well-being(Larkey et al. 2016). Limited data supports the advantages of 40–60 minutes of supervised TC training three times a week for eight to twelve weeks to reduce fatigue among cancer survivors. However, TC may mitigate cancer-related fatigue, but the quality of existing studies is low(L. Yang et al. 2021). Studies that reported on the beneficial effects of TC and Qigong on QOL and fatigue among patients with cancer, are limited in number, therefore evidence or general conclusion should me made with caution(Y. Zeng et al. 2014). TC and Qigong are two mind-body practices that have the potential to address a variety of biopsychosocial factors that are present in supportive cancer care(Carlson et al. 2017). They are ancient Chinese mind-body exercises that have a similar background, combining aspects of traditional Chinese medicine, martial arts, and a philosophy of living(Jahnke et al. 2010). In general, TC has a positive impact on cancer patients' QoL(Y.-W. Chen et al. 2016). The results of several clinical trials demonstrated that TC reduced inflammatory

responses and improved QoL, muscle strength, shoulder function, bone formation, and insomnia in patients with BC(Irwin et al. 2014),(Mustian et al. 2016). Several studies have shown that Qigong improves QoL and relieves depression and anxiety(Meng et al. 2021).

The objective of this umbrella review was to evaluate the effects of TC and Qigong on QoL and fatigue among patients with BC. We conducted this review of reviews because of the lack of clarity in establishing the effectiveness of TC and Qigong in mitigating cancer-related fatigue and improving quality of life among patients with BC. We compiled all the evidence from existing systematic reviews and meta-analyses on this topic to give a high-level overview. There are several competing and contrasting interventions on whether TC and Qigong are effective in mitigating fatigue and improving quality of life among cancer survivors. An overview of all the conducted reviews of each of these interventions is useful in determining how to best translate the evidence into practice. Our major aim was to determine what is known about this topic, what remains unspecified, and make appropriate recommendations for further research.

Methods

Relevant systematic reviews and meta-analyses regarding the effects of TC and Qigong on fatigue and quality of life among patients with BC were systematically gathered and assessed. It was carried out using the preferred reporting items for systematic reviews and meta-analyses checklist and the Cochrane systematic reviews guidelines (Liberati et al. 2009)(Fig. 1 and 2). The protocol was registered on PROSPERO (260174).

Database search

Three electronic English medical databases (PubMed, Scopus, and Web of Science) were systematically searched from inception up to July 2021. Population (patients with BC) Intervention (TC and Qigong) Comparison (No intervention) Outcome (Decrease in cancer-related fatigue and improvement in QoL compared to no exercise and patients who only participate in normal or routine health care) (PICO) framework was used to identify and select the papers. The following search terms of the databases in various relevant combinations are used to screen potential studies: ((((Tai Chi) OR Qigong) AND breast cancer AND fatigue)) and ((((Tai Chi) OR Qigong) AND breast cancer AND (quality of life))). There were no language and publication date restrictions.

Selection of study

The first two authors (SG and CEO) screened the literature by examining the titles and abstracts independently. Then, the full texts of the potentially eligible studies were obtained, and it was decided whether they should be included in the review. Additionally, other potentially relevant papers were searched using the reference lists of the identified articles. Disagreements were resolved by discussions between the two reviewers and, if necessary, through discussions with the third and fourth reviewers (GL, SN).

Eligibility criteria

Articles were eligible for inclusion if the authors had performed a systematic review and meta-analysis search to identify pertinent studies that examined the effects of TC and Qigong on fatigue and QoL among patients with BC. We excluded studies in which risk factors were used for screening, diagnostic or prognostic purposes, or if they were not systematic reviews and meta-analyses. No language restriction was applied. All duplicate records were excluded from medical databases. From each eligible systematic review and meta-analysis, information was extracted on the first author, country, study design, year of publication, the number of patients, outcomes, and quality assessment (Table 1 and 2). References were managed using ZOTERO.

Quality assessment

Quality assessment was independently conducted by the first two authors (SH and CEO) using a measurement tool to assess systematic reviews (AMSTAR)(Shea et al. 2007). The AMSTAR is an 11-item tool that can be used to assess the methodological quality of systematic reviews by assessing the presence of: 1) an a priori design; 2) duplicate study selection and data extraction; 3) a comprehensive literature search; 4) the use of status of publication as an inclusion criteria; 5) a list of included/excluded studies; 6) characteristics of included studies; 7) documented assessment of the scientific quality of included studies; 8) appropriate use of the scientific quality in forming conclusions; 9) the appropriate use of methods to combine findings of studies; 10) assessment of the likelihood of publication bias; and 11) documentation of conflict of interest. Differences regarding the AMSTAR score were resolved by a decision made by the third and fourth authors. The quality of the included review reflects the reliability and clarity of the quality assessment conducted. This can be classified as high quality (scores ≥8/11) as assessed using the AMSTAR tool, moderate quality (6 or 7), and lower quality reviews (scoring 5 or less). The quality of the reviews varied; however, most of the studies scored 6/11 and slightly above on the AMSTAR tool, indicating moderate quality evidence.

Synthesis and extraction

One author (CEO) extracted data from the studies with support through discussion with the review team to resolve any concerns regarding data extraction. A descriptive approach was used to synthesize the data, which involved textual narrative summaries and tabulation of data. The purpose of the narrative synthesis was to organize the findings of the selected studies and evaluate the effects of the interventions. Table 1 and 2 shows the methods used for each study and how the training was conducted in each study. The included studies mostly evaluated randomized controlled trials (RCTs) and intervention studies on the effects of TC and Qigong on fatigue and QoL among patients with breast cancer.

Results

Nine systematic reviews and meta-analyses were included in this umbrella review (see table 1 and 2). 3 systematic reviews and meta-analyses reported the effects of Tai Chi and Qigong on cancer-related fatigue among patients with BC. 4 studies reported the effects of Tai Chi and Qigong on quality of life among patients with BC. Whereas 2 studies reported the effects of Tai Chi and Qigong on both cancer-related fatigue and quality of life.

Evaluation of study design

Interventions that compared any type of Qigong to any type of control group were included in one study(Meng et al. 2021). The type of Qigong, program length, session length, frequency, and other characteristics were not limited. Adult patients (≥18 years) diagnosed with breast cancer were included in the study, regardless of BC stage or previous or current treatment. PubMed, Cochrane Central Register of Controlled Trials, Web of Science, Sinomed, Wanfang, VIP, and China National Knowledge Infrastructure databases were searched for controlled clinical trials from their start until March 2020(Meng et al. 2021). Up until June 2019, Liu et al., searched OVID MEDLINE, AMED, EMBASE, CINAHL, Cochrane Central Register of Controlled Trials, CNKI, VIP, and Wanfang Data for RCTs evaluating the effects of TC among patients with BC. For the resulting syntheses, meta-analyses were used. Sixteen randomized controlled trials involving 1268

participants were included in this review(L. Liu et al. 2020). Duan et al., conducted a systematic review and meta-analysis in which all relevant citations published from inception to October 23, 2019, were searched in Medline via PubMed, EMBASE, and the Cochrane Library databases(Duan, Xu, and Li 2020). The study included 15 RCTs with 1461 participants that met the inclusion criteria. The participants' average age ranged from 44 to 66 years old, with intervention durations ranging from 3 to 24 weeks and sample sizes ranging from 16 to 410. TC, Qigong, yoga, and dancing were among the most popular mind-body exercises. The exercise sessions ranged from around 20 to 90 minutes, so they were done anywhere from twice a week to once a day(Duan, Xu, and Li 2020). According to one study, a comprehensive search of four electronic databases was conducted to find randomized and non-randomized clinical studies evaluating TC and Qigong for tiredness, sleep problems, depression, pain, and QoL in cancer patients that had been published between August 2016 and August 2017 (Wayne et al. 2018). There were 22 studies found, including 15 RCTs with a total of 1283 participants, 75% of whom were women. TC and Qigong training lasted anywhere from 3 to 12 weeks(Wayne et al. 2018). To find RCTs that assessed the benefits of TC on fatigue, Song et al., searched nine databases (PubMed, Web of Science, Ovid, the Cochrane Library, Embase, and four Chinese databases). To find possibly relevant studies, they looked through the reference lists provided in the found RCTs(Song et al. 2018). There were 22 studies found, including 15 RCTs with a total of 1283 participants, 75% of whom were women. Breast (n = 7) and prostate (n = 2) cancers, as well as lymphoma (n = 1), lung (n = 1), and combination (n = 4) malignancies, were studied in RCTs. The active intervention (n = 7) was compared to normal care (n = 5) or both (n = 3). TC and Qigong training lasted anywhere from 3 to 12 weeks(Song et al. 2018). Until September 30, 2018, Zeng et al., three databases (Medline, CINAHL, and the CAJ Full-text Database) were searched(Y. C. Zeng, Xie, and Cheng 2019). For inclusion, RCTs of TC/Qigong as a cancer treatment intervention were examined(Y. C. Zeng, Xie, and Cheng 2019). This updated review included a total of 915 individuals from 12 investigations conducted since 2014. Participants in the study ranged in age from 57 to 72, with sample sizes ranging from 19 to 197. All the studies in this review are randomized controlled trials. Seven of the twelve RCTs employed Qigong. Four studies combined TC and Qigong interventions, whereas one study only used TC. The programs ranged from around 3 to 12 weeks, with each session lasting 60 minutes. Supervised training frequency ranged from three times per day to twice a week(Y. C. Zeng, Xie, and Cheng 2019).One of the selected study

search approaches yielded 574 different studies, the majority of which were duplicate records or did not report RCTs(W.-F. Lin et al. 2019). Therefore, 149 full-text papers were thoroughly assessed based on the inclusion and exclusion criteria, yielding a final sample of 34 studies(W.-F. Lin et al. 2019). One study searched for available randomized controlled trials on the effectiveness of TC in relieving treatment-related side effects and quality of life in women with breast cancer on the following databases: PubMed (1966–November 2014), Embase (1974–November 2014), Cochrane Library (issue 11, 2014), and Web of Science (1974–November 2014). By searching databases, a total of 93 studies were discovered. There were 28 duplicates and 57 that did not match the criterion for inclusion. Each trial's baseline values were comparable, and the meta-analysis included nine RCTs(Pan et al. 2015). One study evaluated whether TC enhances QoL among BC survivors (Pan et al. 2015) to find relevant RCTs, a systematic search of electronic databases was conducted. The primary goal was quality of life, with secondary outcomes including body mass index, bone mineral density, and muscle strength. The meta-analysis includes five RCTs with a total of 407 patients (Pan et al. 2015).

Effects of Tai Chi and Qigong on fatigue among patients with breast cancer

Duan et al., in their meta-analysis found that TC significantly decreased relieved fatigue among survivors of any cancer (Standardized mean difference (SMD): −0.95; 95% CI: −1.48 to −0.43)(Duan, Xu, and Li 2020). On the other hand, Meng et al., found that Qigong was not significant enough to relieve symptoms of fatigue among women with BC ($n = 401$, SMD = −0.32, 95 % CI 0.71 to 0.07, $P = 0.11$)(Meng et al. 2021). From the outcome of their meta-analysis, Wayne et al., (Wayne et al. 2018) found that TC and Qigong significantly decreased fatigue among patients with BC (effect size = −0.53, p<.001). Liu et al.,(L. Liu et al. 2020) evaluated 2 RCTs involving female patients with BC, and they found that TC as a supplement to conventional treatments, was more effective in reducing fatigue after three months of practice (SMD = −0.91, 95% CI -1.30 to −0.53). In addition to the findings of Liu et al. (L. Liu et al. 2020), Song et al.,(Song et al. 2018) found that TC relieved fatigue among patients with BC (SMD = - 0.81; p < 0.00001). Furthermore, they also realized that short-term cancer-related fatigue was improved better by a longer intervention time of 8-12 weeks than by a shorter duration.

Effects of Tai Chi and Qigong on quality of life among patients with breast cancer

Meng et al.,(Meng et al. 2021) reviewed thirteen trials that used generic scales to assess the effects of Qigong on QoL. In comparison to control procedures, Qigong had a beneficial effect on QoL (n = 950, SMD, 0.65, 95 percent CI 0.23–1.08, P = 0.002). On the other hand, Yan et al.,(Yan et al. 2014) analyzed five RCTs involving 407 BC survivors. The pooled standardized mean differences were 0.10 (95% confidence interval (CI): -0.35-0.54) for physical well-being, 0.03 (95% CI: -0.18-0.25) for social/family well-being, 0.24 (95% CI: 0.02-0.45) for emotional well-being, 0.23 (95% CI: -0.03-0.49) and for functional well-being. The meta-analyses showed insufficient evidence to support TC's potential to improve the quality of life among breast cancer patients and survivors (Yan et al. 2014). Duan et al.,(Duan, Xu, and Li 2020) found that TC and Qigong, and other mind-body exercises had no significant improvement in overall QoL. Moreover, Zeng et al.,(Y. C. Zeng, Xie, and Cheng 2019) found no statistically significant association between Qigong alone or combined with TC and improvement in QoL (p= 0.17). According to Pan et al.,(Pan et al. 2015), there was no statistically significant evidence that TC improved health-related QoL among patients with stage I-II breast cancer. However, Lin et al.,(W.-F. Lin et al. 2019) found that Qigong combined with mindfulness therapy improved health-related QoL among patients with cancer.

Discussion

Some researchers believes that **s**low movements in TC and Qigong, combined with a decrease in breath frequency, may alter the autonomic nervous system and restore homeostasis thereby relieving stress induced by hypothalamus-pituitary-adrenal axis reactivity and shifting the autonomic nervous system's balance toward parasympathetic dominance(Yeung et al. 2018). Most studies on the effects of TC and Qigong on cancer-related fatigue and QoL among patients with BC, have poor experimental design regarding the method, content of intervention and research methodologies(Tao et al. 2016). However, some researchers suggested that TC and Qigong improve QoL and relieve fatigue among patients with BC regardless of the stage of cancer(Tao et al. 2015). Furthermore, an important insight of research in the field of exercise oncology supports TC and Qigong as potential additional or alternative therapeutic exercises for patients with various cancers in addition to conventional treatment. Many areas of clinical research and application in this field are still being investigated(Klein, Baumgarden, and Schneider 2019). This will also improve other treatment outcomes when performed by patients with BC. According to several studies, consistent TC practice boosts antioxidant capacity and decreases oxidative stress by increasing superoxide dismutase and catalase levels while also lowering lipoperoxide levels(Rosado-Pérez et al. 2021). When performed by patients with breast cancer, it will improve treatment outcomes. According to the selected studies for this umbrella review, most RCTs concerning the effects of Tai chi and Qigong on fatigue and quality of life among patients with cancer are not of high research quality in terms of the design, method of conducting the exercise intervention, data analysis and interpretation of results. The reviews' quality varied, but most of the reviews received a 6/11 or slightly higher on the AMSTAR instrument, indicating intermediate level evidence.

Strengths and limitations

This is the first comprehensive assessment of systematic reviews and meta-analyses evaluating the effects of TC and Qigong on fatigue and QoL among patients with BC. The major limitation was that most of the RCTs evaluated and pooled in the systematic reviews and metanalyses were of low quality and had ambiguous methodology.

Conclusion

TC and Qigong have shown potential as supplementary therapies in the treatment of fatigue and improving QoL among patients with BC. However, there is moderate evidence indicating that TC and Qigong reduce fatigue and improve health related QoL among patients with BC. As a result, larger sample sizes, and higher-quality RCT designs with follow up studies are required to evaluate the effects of different tailored TC and Qigong regimens on fatigue and health-related QoL among patients with BC at different stages.

Table 1. Summary of studies that reported on the effects of Tai Chi and Qigong on cancer-related fatigue among patients with breast cancer.

Authors	*Country*	*Study Design*	*year*	*Number of Patients*	*Type of intervention*	*outcomes*	*Quality assessment (AMSTAR)*
Meng et al	China	SR and Meta-analysis	2021	401 Adult patients (≥18 years) with Breast cancer	Qigong	Qigong had no significant benefit on fatigue	7/11
Duan et al.	China	SR and Meta-analysis	2020	1461 Adult patients (≥18 years) with any type of cancer	Tai Chi, Qigong, yoga, and dance	Tai Chi group was significantly decreased fatigue	6/11
Liu et al	New Zealand	SR and Meta-analysis	2020	1268 Breast cancer patients	Tai Chi, Qigong, walking	When combined with other supportive care strategies, Tai Chi significantly reduces fatigue in patients with breast cancer.	6/11
Wayne et al	USA	SR and Meta-analysis	2018	1571 cancer survivors	Tai Chi, Qigong	Tai Chi and Qigong was associated with significant improvement in Fatigue.	7/11
Song et al	China	SR and Meta-analysis	2018	373 Cancer Survivors	strength/resistance training, walking, cycling, yoga, Qigong, Tai Chi	Patients with breast cancer who practice Tai Chi for more than 8 weeks experience short-term relief from fatigue.	8/11

Table 2. Summary of studies that reported on the effects of Tai Chi and Qigong on quality of life among patients with breast cancer.

Authors	*Country*	*Study Design*	*year*	*Number of Patients*	*Type of intervention*	*outcomes*	*Quality assessment (AMSTAR)*
Meng et al	China	SR and Meta-analysis	2021	950 adult patients (≥18 years) with breast cancer	Qigong	The finding revealed that Qigong had a significant impact on quality of life.	7/11
Duan et al.	China	SR and Meta-analysis	2020	1461 adult patients (≥18 years) with any type of cancer	Tai Chi, Qigong, yoga, and dance	Tai Chi and Qigong had no significant improvement in overall quality of life.	6/11
Zeng et al	China	SR and Meta-analysis	2019	915 cancer survivors	Qigong, Tai Chi	There was no statistically significant correlation between Qigong or Qigong combined with Tai Chi and improvement in quality of life.	7/11
Lin et al	China	SR and Meta-analysis	2019	3010 patients with cancer	Yoga ,chinese herbal medicine, nutrional suppliment, Acupuncture, Multimodal complementary medicine, Qigong, Mindfulness, Massage	Qigong combined with mindfulness therapy improved health related quality of life among patients with cancer	6/11
Pan et al	China	SR and Meta-analysis	2015	322 patients with stage I-II breast cancer	Tai Chi	there was no improvement in the general health-related quality of life in the Tai Chi group compared with the control group	6/11
Yan et al	China	SR and Meta-analysis	2014	407 Breast Cancer Survivors	Tai Chi	Currently, there is insufficient data to support Tai chi's ability to improve quality of life in breast cancer survivors	7/11

Figure 1. PRISMA checklist for studies that reported on the effects of Tai Chi and Qigong on cancer-related fatigue among patients with breast cancer.

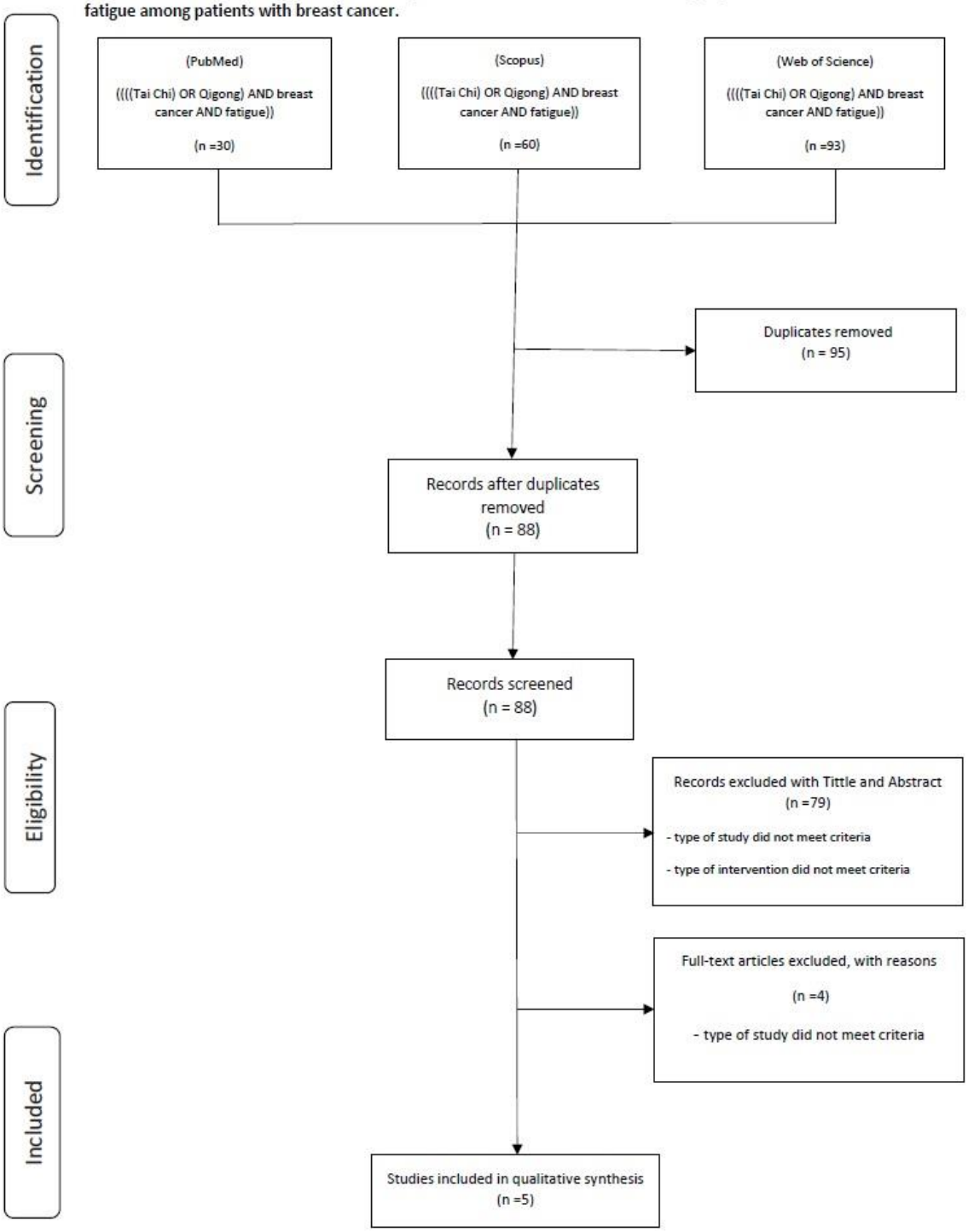
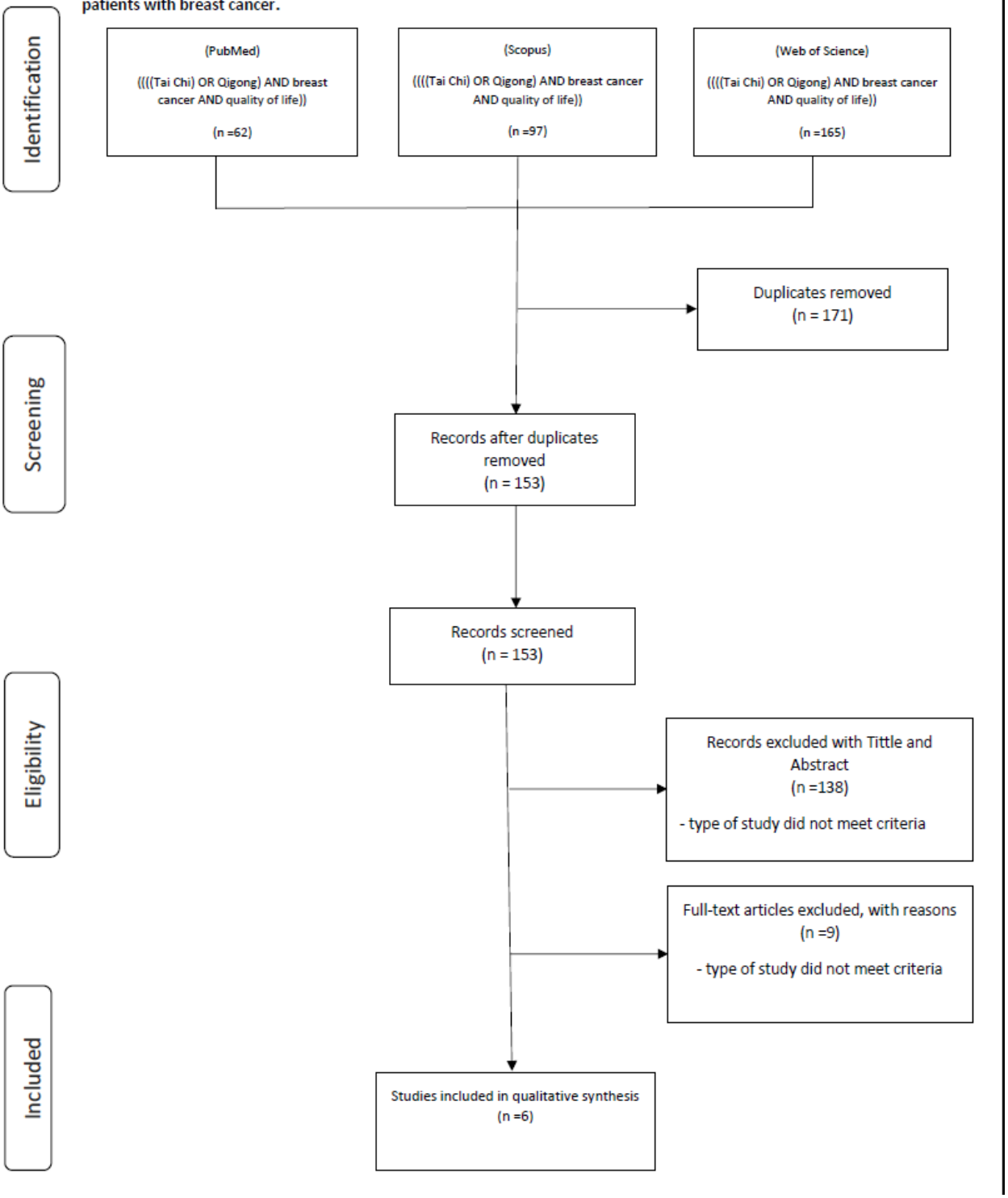


Figure 2. PRISMA checklist for studies that reported on the effects of Tai Chi and Qigong on quality of life among patients with breast cancer.



Chapter 6

Pilates- Based Exercise In The Reduction Of the Low Back Pain: an Overview of Reviews

Pilates- based exercise in the reduction of the low back pain: an overview of reviews [*]

Abstract

Background: The purpose of this umbrella review of systematic reviews and reviews, determine the effects of the Pilates Method-exercise on patients with chronic low back pain (LBP).

Methods: In December 2019, a literature search was conducted using the databases Web of Science, (PubMed) and Scopus. Studies that addressed this topic were included.

Results: Eleven articles met the inclusion criteria. Three studies were review and eight were systematic review studies that analysed Pilates interventions and evaluated effectiveness by reducing LBP. A quality assessment was developed using AMSTAR 1.

Conclusion: According to the published literature, there was pain relief and functional improvement from the Pilates-based exercise intervention in the short term in people with chronic low back pain. There was strong evidence that Pilates exercise improved flexibility and dynamic balance and enhanced muscular endurance in healthy people in the short term. For body composition, there was some evidence that Pilates exercise may be effective in reducing body fat and increasing fat-free mass in the short term. Further research will be needed to gain robust evidence of its efficacy.

[*] ***Gholamalishahi, S***., Backhaus, I., Cilindro, C., Masala, D., La Torre, G. (2021). Pilates- Based Exercise In The Reduction Of Low Back Pain: an overview of reviews. Eur Rev Med Pharmacal Sci.

Introduction

Low back pain (LBP) is a common symptom occurring in people of all ages, typically located between the lower ribs and the buttock creases. Sometimes it is accompanied by leg pain or lower limb neurological symptoms (Qin et al. 2019). Low back pain is defined as 'pain, increased muscle tension and/or stiffness with or without referred lower limb pain and localized between the costal margin and the inferior gluteal folds also is one of the most common complaints seen in general practitioners' offices, and it contributes to social, emotional, physical, and economical losses(Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). There are 7.3% worldwide population suffering activities limited caused by LBP at any one time, with the increasing tendency in low to middle-income countries. LBP is the most common reason leading to work-related day-off comparing the other occupational musculoskeletal disorders (Qin et al. 2019).

Pilates is a form of exercise based on movement principles including whole-body movement, breathing, concentration, centring, precision, and rhythm. Pilates is a mindful approach exercise that is utilized for health enhancement and treatment of a variety of diseases (Yamato et al. 2016). Pilates Exercise (PE) was developed by Joseph Pilates in the 1920s. He claimed that this set of corrective exercises promoted. voluntary control over the body and effective posture, stabilizing core muscles during dynamic movement, and promoted physical and mental vitality. It has also been shown that this exercise promotes strength and flexibility and is popular among women of all ages (Jago et al. 2006). The Pilates method is a concept of body and mind exercise founded by Joseph H Pilates in the early 1900s (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). Pilates is a series of about 500 exercises and drew inspiration from yoga, martial arts, Zen meditation, ballet, as well as ancient Greek and Roman exercise (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). Pilates lengthens and stretches all the major muscle groups in the body in a balanced fashion (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). It improves flexibility, strength, balance, and body awareness. Pilates aims to strengthen the body in an even way, with an emphasis on core strength to improve general fitness and wellbeing (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019).

There is evidence that Pilates-based exercises are useful to reduce LBP (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). The practices based on this method have promoted the restoration of the function of muscles involved in lumbopelvic stabilization, that is, transversus abdominis, multifidus, diaphragm, and pelvic floor muscles. During each exercise, specific principles of this method should be followed to restore or sustain the motor control of the lumbar spine and proper body posture (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019).

The recent systematic review has investigated that Pilates is a system of exercises widely used in patients with low back pain and improved flexibility, dynamic balance, and enhanced muscular endurance in healthy people in the short term and reducing pain and disability in people with chronic low back pain (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019).

Therefore, this overview of the review aims to provide a summary of the evidence available using already published systematic and narrative review to assess the effects of the Pilates Method-exercise on patients with chronic LBP.

Method

The Preferred Reporting Item for Systematic Review and Meta-Analyses (PRISMA) statement was followed (Liberati et al. 2009)to perform this umbrella review of systematic reviews (Fig.1).

2.1. Identification of relevant studies

Relevant systematic reviews that examined the effect of Pilates on LBP were identified through systematic searches of three electronic databases PubMed, Web of Science and Scopus, and using the keywords (“Pilates-based exercises” OR Pilates) AND “treatment” AND “low back pain”) with the Boolean operator. The limits applied to refer to the language of the articles (English, Spanish, Italian) but not to the year of publication. When a duplicate or repeated publication were encountered in the database search, the papers, when eligible, were considered only once. We searched all databases from the date of their inception to December 2019. The full electronic search strategy is provided in Appendix A.

2.1.1. PubMed

("exercise movement techniques"[MeSH Terms] OR ("exercise"[All Fields] AND "movement"[All Fields] AND "techniques"[All Fields]) OR "exercise movement techniques"[All Fields] OR ("pilates"[All Fields] AND "based"[All Fields] AND "exercises"[All Fields]) OR "pilates based exercises"[All Fields]) AND ("therapy"[Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "therapeutics"[MeSH Terms] OR "therapeutics"[All Fields]) AND ("low back pain"[MeSH Terms] OR ("low"[All Fields] AND "back"[All Fields] AND "pain"[All Fields]) OR "low back pain"[All Fields]) AND ("review"[Publication Type] OR "review literature as topic"[MeSH Terms] OR "review"[All Fields]).

2.1.2. Scopus

(Pilates-ased AND exercises AND treatment AND low AND back AND pain AND review)

2.1.3 Web of science

Ts= (Pilates-based) AND Ts= (exercises) AND Ts= (treatment) AND Ts= (low) AND Ts= (back) AND Ts= (pain)

2.2. Study selection and eligibility criteria

For the analysis, all studies were selected independently by two researchers evaluating the association between the Pilates-based exercises in the reduction of the LBP. Eligibility criteria based on the PICOS (population, intervention/exposure, comparator group, outcome, and study design) were used as follows: Population: people with LBP; Intervention/Exposure: Pilates-based exercises; Compared with no exercise and patients who only performed usual or routine health care; Outcomes: reduction of pain; Study design: systematic reviews and review.

Articles were excluded if studies were not about on the topic "Pilates-based exercises and low back pain". All duplicate records were excluded from medical databases. References were managed using ZOTERO. The methodological quality assessment will be done using the AMSTAR1 tools, for a systematic review.

2.3. Data extraction and quality assessment

Data were independently extracted by two different researchers who independently reviewed the papers to identify relevant information and rated the quality of systematic reviews using the AMSTAR tool (Shea et al. 2007)(Table 1). Disagreements about quality were solved with a third researcher.

Results

3.1. The Identification of Relevant Studies

The electronic search initially resulted in 71 citations of which 61 remained after deduplication. Following the screening of titles and abstracts, 48 studies were excluded as they did not meet the inclusion criteria. After full-text screening 2 articles removed because the type of intervention did not meet the criteria. Ultimately, eleven articles were included in the umbrella review. Among these, three were Review articles(Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019),(H. T. Lin et al. 2016),(Lim et al. 2011) and eight were systematic review (Yamato et al. 2016),(La Touche, Escalante, and Linares 2008),(Patti et al. 2015), (C. Wells et al. 2014), (Miyamoto, Costa, and Cabral 2013), (L. M. Pereira et al. 2012), (Posadzki, Lizis, and Hagner-Derengowska 2011),

(Aladro-Gonzalvo et al. 2013)studies. Most systematic reviews included primary studies from a range of countries (Australia. Cuba, Brazil, et al) and three reviews included primary studies from (Poland, Taiwan, and Singapore). Tables 1 summarize the characteristics of the included studies.

3.2. Quality of included reviews

The findings of the quality assessment are presented in Table 1. Most systematic reviews were judged to be high quality(Yamato et al. 2016),(C. Wells et al. 2014),(Posadzki, Lizis, and Hagner-Derengowska 2011),(Aladro-Gonzalvo et al. 2013), five were mediocre (Lim et al. 2011),(La Touche, Escalante, and Linares 2008),(Patti et al. 2015),(Miyamoto, Costa, and Cabral 2013),(L. M. Pereira et al. 2012) but two of were low quality (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019),(H. T. Lin et al. 2016). In study by Eliks et al did not consider PICO and any PRISMA flowchart and just compared the previous reviews about the effectiveness of Pilates in chronic LBP (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019).

Summary of findings

The findings from systematic reviews (including studies up to 2008) and current research (up to 2019) were incorporated. The search strategy generated a total of 71 references, of which 11 were considered potentially relevant. Reasons for exclusion included no special outcome measure, trials including Pilates, and patients with LBP. The studies by Kamioka et al (2016) and Well et al (2013) were excluded because they were a summary of a systematic review about Pilates exercise in people with chronic low back pain(Kamioka et al. 2016),(C. Wells et al. 2013). Eleven studies meeting the criteria mentioned above were included. Pilates was used in all three studies. LBP patient populations were heterogeneous, and the descriptions of pain included chronic non-specific back pain, disability in individuals with persistent nonspecific low back pain and chronic pain.

Among the eleven included in this umbrella review, three studies were review and originated from Poland (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019) Taiwan(H. T. Lin et al. 2016) and Singapore (Lim et al. 2011). Eliks et al (2019) conducted Pilates is a system of exercises widely used in patients with Low Back Pain and have a positive effect such as reducing pain and

improving functional outcomes was observed in short term (up to 3 months) (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). This study aimed to present the knowledge concerning the application of Pilates method in the management of chronic non-specific LBP as well as to define factors for example (duration, frequency, exercise performed on a mat or specific equipment), influencing the effectiveness of Pilates in these individuals. This review analysed reviews, systematic reviews (including Cochrane Database of Systematic Reviews), and meta-analysis from the years 2005-2015 (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). According to this study, it has been recommended that sessions supervised should last about 60 min with a frequency of two to three times a week. The positive effects of Pilates were observed after a period from 68 weeks to 3-6 months (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019).

Lin et al (2016) evaluated the effects of Pilates on patients with the chronic low back. In this study, eight randomized controlled trial articles were included from forty studies up to the year 2015. It was found that Pilates compared with no or little intervention, usual healthcare applied in the 4-12-week program can be effective in pain reduction and functional improvement. Another exercise for example therapy exercise showed effects like those of Pilates if waist or torso movement was included and the exercises were performed for 20 cumulative hours (H. T. Lin et al. 2016).

In 2011, Lim et al. compared pain and disability in individuals with persistent nonspecific low back pain who were treated with Pilates exercises compared to minimal or other interventions. The results indicated that Pilates-based exercise was superior to minimal intervention for the reduction of pain in individuals with nonspecific low back pain (Lim et al. 2011). However, the authors showed no existing evidence that can establish the superiority of Pilates-based exercise on other forms of exercise to reduce pain and disability for patients with persistent nonspecific LBP.

A systematic review conducted by Yamato and colleagues (2016) the effects of the Pilates for patients with nonspecific acute, subacute or chronic low back pain and demonstrated there is low- to moderate-quality evidence that Pilates is more effective than a minimal intervention with most of the effect sizes being considered medium for pain intensity and disability (Yamato et al. 2016). In this study, search retrieved 126 trials, of which 10 were included in the review (n= 510 participants). Seven studies were considered to have a low risk of bias and three were considered at high risk of bias (Yamato et al. 2016). The periods for outcomes assessment defined as short

term (<3 months after randomization), intermediate term (>3 months and <12 months after randomization), and long term (>12 months after randomization) (Yamato et al. 2016).

Patti et al. (2015) considered twenty-nine systematic reviews and meta-analyses and randomized control trials from 2000 to 2014. Twenty studies showed a reduction of LBP, and nine studies evaluated the pain before and after interventions and the results compared with the control group both with and without interventions and with alternative pharmaceutical interventions. In this systematic review, conducted Pilates method-based exercise is more effective than no treatment or minimal physical exercise interventions in the management of chronic nonspecific low back pain (Patti et al. 2015).

A systematic review by Wells et al (2014) which included 14 randomized controlled trials (RCT) selected from 152 studies between the years 2005-2014, showed that Pilates exercise results in statistically significant improvement in pain and functional ability in the short term compared to usual care and physical activity in people with chronic LBP (C. Wells et al. 2014). Usual care and physical activity could involve unknown other treatment, no treatment, education, medications, or conclusions with health professionals such as physiotherapists and other forms of exercise ranged from cycling, McKenzie exercise, traditional lumbar stabilization exercise and mixed form of exercise including stretching strengthening and stabilization (C. Wells et al. 2014).

From the scientific systematic review, it was seen that Pilates is moderately better than another physiotherapeutic treatment in reducing disability and provides comparable benefits to minimal intervention (Yamato et al. 2016).

The study of Miyamoto et al (2013) displayed that Pilates was better than a minimal intervention to reducing pain and disability in patients with the chronic low back. Pilates was not better than another type of exercise for short-term pain reduction (C. Wells et al. 2014).The inclusion criteria for the analysis were studies that were randomized controlled trials of adults with chronic nonspecific low back pain that evaluated pain and /or disability; studies in which the primary treatment was based on Pilates method exercises compared with no treatment, minimal intervention, other types of intervention or another type of exercises (C. Wells et al. 2014).

Pereira et al (2012) compared the Pilates method with no exercise or lumbar stabilization for pain and functionality in patients with chronic LBP. Five studies met the inclusion criteria. The total number of patients was seventy-one in the Pilates group and sixty-eight in the control group.

The author found that the Pilates method did not improve functionality and pain in patients who have LBP when compared with no exercise patients and lumbar stabilization exercise groups (L. M. Pereira et al. 2012).In line with Posadzki et al in 2011 highlighted the insufficient number of studies and the poor methodological quality of available evidence; so accordingly, they concluded that there was inconclusive evidence that Pilate's method is effective in reducing pain and disability in people with chronic LBP. However, some of the authors of the reviewed studies conclude that Pilates better therapeutic results than usual or standard care (Posadzki, Lizis, and Hagner-Derengowska 2011).

In the study by La Touche R et al in 2008 demonstrated positive effects, such as improved general function and reduction in pain and disability when applying the Pilates method in treating non - specific chronic low back pain in adults (La Touche, Escalante, and Linares 2008).

Discussion

The purpose of this umbrella review was to summarize and compare systematic reviews and reviews and determining the effects of the Pilates Method-exercise on patients with chronic LBP. The Pilates method, using functional exercises, improves muscular strength and endurance (Yamato et al. 2016). Table 1 presents a summary of eleven studies. Nine of SRs and R (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019),(H. T. Lin et al. 2016),(Lim et al. 2011),(Yamato et al. 2016),(La Touche, Escalante, and Linares 2008),(Patti et al. 2015),(C. Wells et al. 2014),(Posadzki, Lizis, and Hagner-Derengowska 2011),(Aladro-Gonzalvo et al. 2013) for chronic LBP concluded that there were pain relief and functional improvement from the Pilates-based exercise intervention in the short term. There was strong evidence that Pilates exercise improved flexibility and dynamic balance and enhanced muscular endurance in healthy people in the short term. For body composition, there was some evidence that Pilates exercise may be effective in reducing body fat and increasing fat-free mass in the short term (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019),(H. T. Lin et al. 2016) (Lim et al. 2011),(Yamato et al. 2016),(La Touche, Escalante, and Linares 2008),(Patti et al. 2015),(C. Wells et al. 2014),(Posadzki, Lizis, and Hagner-Derengowska 2011),(Aladro-Gonzalvo et al. 2013). Two SRs reported that the effectiveness of Pilates-based exercise could not be confirmed (C. Wells et al. 2014),(L. M. Pereira et al. 2012).

Miyamoto et al (2013) asserted that the Pilates method was better than other types of exercise for short-term pain reduction (C. Wells et al. 2014). They suggested that the Pilates method can be recommended for the reduction of pain and disability, but no definitive conclusion can be made regarding the analysed outcomes in the medium term (C. Wells et al. 2014). The newest review in 2019 by Eliks et al analysed all reviews and systematic reviews about the effectiveness of Pilates in chronic LBP. They found in several studies including reviews, a positive effect of Pilates such as decrease pain and improving functional outcomes was observed in the short term (up to 3 months). It must consider that most trials were carried out in a small group (up to 50 participants) with females at an average age of 40-50 years (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). As well as it has been recommended that sessions supervised should last about 60 min with a frequency of two to three times a week. The positive effects of Pilates were observed

after a period from 68 weeks to 3-6 months (Eliks, Zgorzalewicz-Stachowiak, and Zeńczak-Praga 2019). In systematic review by Wells et al (2014) prepared based on 14 randomized controlled trials and selected from 152 studies from the years 2005-2014 and compared the Pilates method with minimal intervention (usual care), massage and other forms of exercise such as Cycling, McKenzie and traditional lumbar stabilization exercise and mixed from treatment package, stretching, strengthening and stabilization. Pilates programs were one to three times per week, for 4-15 weeks, and the duration of each session was 30-60 min. Mats or specialized Pilates exercises were used. The evaluation of the therapeutic program was carried out after 4-15 weeks. In one study, the follow up after 24 weeks and the results suggested that Pilates exercise offers greater improvements in pain intensity and functional ability compared with usual care and physical activity minimal interventions in the short term but in comparison to a massage or other forms of exercise, the Pilates method provides equivalent outcomes (C. Wells et al. 2014). The Cochrane systematic review by Yamato et al in (2016) included 10 randomized controlled trials from 2006 to 2014 that compared Pilates to minimal intervention that is, education, non-steroidal anti-inflammatory drugs, following daily activities and no intervention or other types of exercises (McKenzie, general exercise, stationary cycling). Pilates program lasted from 10 to 90 days with a different number of sessions from 6 to 30; approximately 1-hours sessions were performed from one to four times per week. Outcome measures were recorded in short term (up to 3 months) and intermediate-term follow-ups (up to 6 months) so on the low to moderate quality evidence it was found that Pilates is more effective than minimal intervention as regards pain decrease, disability and function outcomes and global impression of recovery in short term, and regarding pain relief and disability outcomes in intermediate-term. Also, this review refers to no conclusive evidence was found that Pilates is superior to other forms of exercise (Yamato et al. 2016). The latest systematic review by Lin et al in (2016) based on eight randomized controlled

trials selected from 40 studies up to the year 2015. The Pilates method was compared with minimal intervention or other forms of exercise. It was found the Pilates compared with no or little intervention, usual healthcare in a 4–12-week program can be effective in pain reduction and functional improvement. This improvement was observed in 12- or 24-weeks follow-ups. However, no minimal clinically important difference in pain relief or functional ability was achieved in the 6-8-week Pilates program and other forms of exercise (H. T. Lin et al. 2016). La Touche et al in 2008 suggested that Pilates method reduces pain and disability, whereas Lim et al

in (2011) reported that Pilates method reduces pain when compared with minimal treatments, but not a disability (La Touche, Escalante, and Linares 2008),(Lim et al. 2011). In contrast, Pereira et al in (2012) concluded that the Pilates method is ineffective in reducing pain and disability (L. M. Pereira et al. 2012), and Posadezki et al in (2011) suggested that evidence was inconclusive (Posadzki, Lizis, and Hagner-Derengowska 2011).

On the contrary, Lim et al (2011), Aladro et al (2013), and Pereira et al in (2012) investigated people with nonspecific LBP(Lim et al. 2011),(Aladro-Gonzalvo et al. 2013),(L. M. Pereira et al. 2012). In the systematic review by Patti et al. (2015) the authors refer to all included articles focused on functional disability and pain. All the studies begin sessions with basic exercises, but the duration and frequency of sessions were significantly different. Therefore, the results showed that Pilates method-based exercise was more effective than no treatment or minimal physical exercise interventions in the management of chronic nonspecific LBP and confirmed the result of Yamato et al in (2016), Miyamoto et al (2013) and Lim et al in (2011) (Patti et al. 2015).

Conclusions

According to the published literature, Pilates method exercise represents a valid tool to improves muscular strength and endurance in people with (LBP) in the short term and effective in reducing body fat and increasing fat-free mass in the short term, and it could reduce pain and disability. Although present data highlight the full potential and possible benefits derived from these techniques, to warrant a widespread diffusion, it would be necessary to further deepen scientific evidence by designing and implementing research studies that could confirm the Pilates method exercise beneficial effects for patients with chronic LBP.

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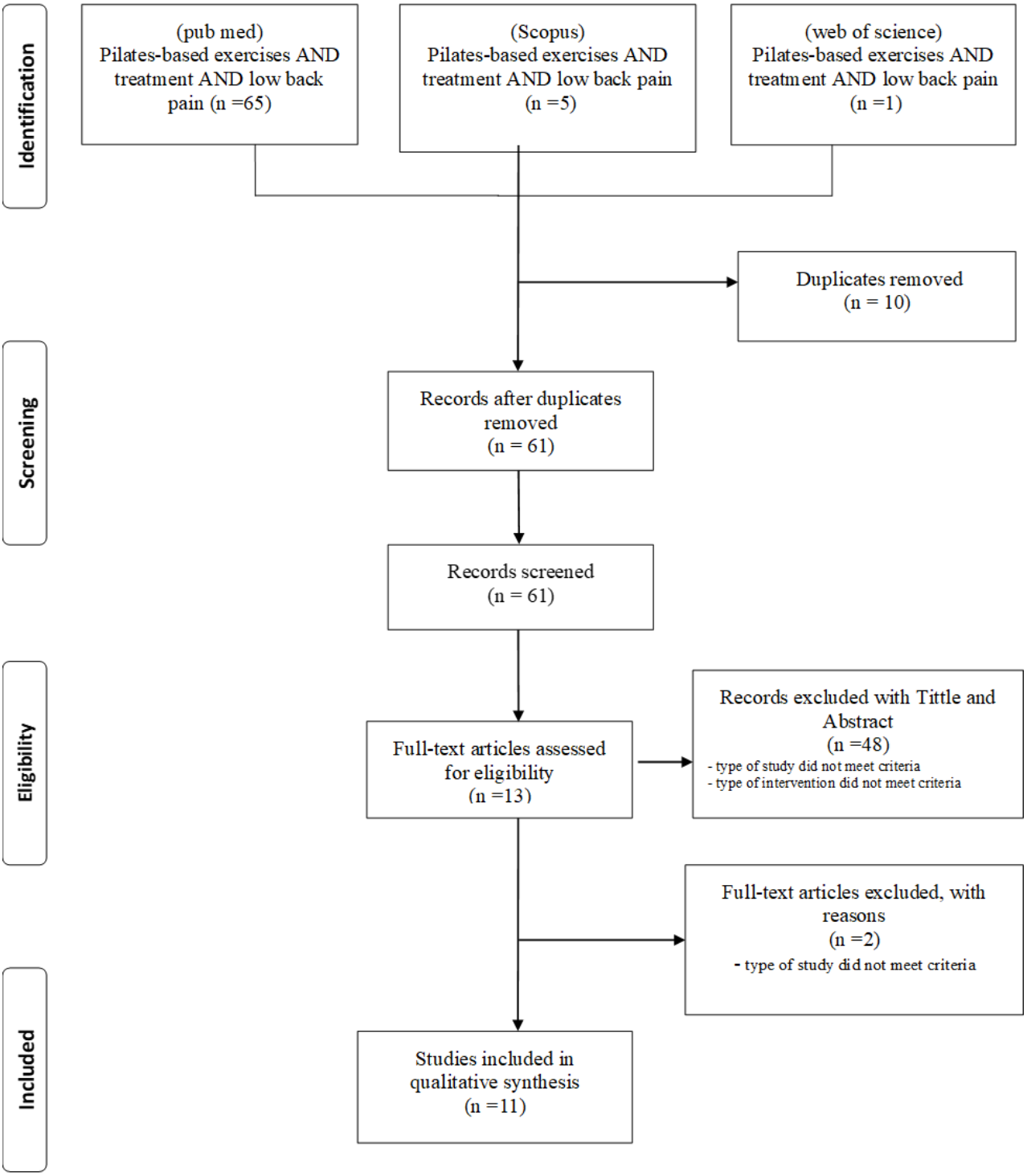
Statement on the contribution of the Authors. G.L and C.C conceived of the presented idea. S.G developed the theory and performed the computations. G.L and I.B and D.M verified the analytical methods. G.L encouraged and supervised the finding of this work. All authors discussed the results and contributed to the final manuscript.

Table (1) summary of findings and quality of evidence for all outcomes included in this umbrella review

Authors	Country	Study design	Number of papers included	Year	Result	Quality assessment (AMESTAR)
Eliks M et al (2)	Poland	R	3	2019	In numerous studies including reviews, a positive effect of Pilates such as reduction pain and improving functional outcomes was observed at short term (up to 3 months).	2
Yamato TP et al (9)	Australia	SR	9	2016	There is slow- to moderate –quality evidence that Pilates is more effective than minimal intervention with most of the effect sizes being considered medium for pain intensity and disability.	10
Lin H-T et al (7)	Taiwan	R	8	2016	In patients with chronic low back pain, Pilates showed significant improvement in pain relief and functional enhancement. Other exercise showed effects similar to those of Pilates.	4
Patti A et al(12)	Italy	SR	29	2015	This systematic search showed evidence that Pilates method-based exercise are more effective than no treatment or minimal physical exercise interventions in the management of chronic nonspecific low back pain.	6
Wells C et al (13)	Australia	SR	14	2014	According to this systematic review, Pilates exercise results in statistically significant improvement in pain and functional ability in the short term compared to usual care and physical activity in people with chronic low back pain.	11
Aladro-Gonzalvo AR et al (17)	Cuba	SR	9	2013	The results of this systematic review demonstrated Pilates is moderately better than another physiotherapeutic treatment in reducing disability and provides comparable benefits to minimal intervention.	11
Miyamoto GC et al (14)	Brazil	SR	7	2013	In this systematic review displayed Pilates was better than a minimal intervention to reducing pain and disability in patients with chronic low back. Pilates was not better than other type of exercise for short-term pain reduction.	9
Pereira LM et al (15)	Brazil	SR	5	2012	This systematic review did not conclude that Pilates improves functionality and pain on patients who have low back pain.	8
Posadzki P et al (16)	Uk	SR	4	2011	The reviewed studies conclude the Pilates better therapeutic results than usual or standard care.	10
Lim ECW et al (8)	Singapore	R	7	2011	The results indicated Pilates – based exercise is superior to minimal intervention for reduction of pain in individual with nonspecific low back pain.	8
La Touche R et al (10)	Spain	SR	3	2008	The results of the studies analyzed positive effects, such as improving general functions and in reducing pain when applying the Pilates method in treating non-specific chronic low back pain in adults.	9

Figure 1. Flow-chart of the search strategy



Appendix A

Include

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Duplication

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Chapter 7

Tai Chi and Workplace Wellness for Health Care Workers: A Systematic Review

Tai chi and workplace wellness for health care workers: A systematic review[*]

Abstract

Several studies show the positive effects of new non-medical therapies known as complementary and alternative medicines (CAMs). In this context, the discipline of tai chi is obtaining a wider consensus because of its many beneficial effects both on the human body and mind. The aim of this study was to perform a systematic review of the scientific literature concerning the relationship between tai chi practice and wellness of health care workers (HCW) in their professional setting. The research was performed in September 2019, investigating the databases Cinahl, Scopus, Web of Science, and PubMed. Full-text articles, written in English language and published after 1995, were taken into account. No restrictions regarding the study design were applied. A quality assessment was developed using AMSTAR, Jadad, Newcastle-Ottawa Scale, INSA, and CASE REPORT scale. Six papers were finally included: Three clinical trials, one observational study, one systematic review, and one case report. The methodological quality of the included studies was judged as medium level. In conclusion, this systematic review suggests the potential impact of interventions such as tai chi as tools for reducing work-related stress among healthcare professionals. Further research will be needed in order to gain robust evidence of its efficacy.

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Introduction

Stress identifies the body's reaction to any change that requires a physical, mental, or emotional response. The World Health Organization (WHO) states that mental health problems such as stress will likely become the second most common disability by 2020 (S. Zheng et al. 2018). Mind–body exercises are increasingly recognized as beneficial for physical, emotional, and mental health (Love et al. 2019). There are many factors that can contribute to make the work of healthcare providers stressful; dealing with death, lack of resources, high workload, and difficult and unpleasant collaboration in teamwork might negatively influence health and work performance of healthcare staff (Gollwitzer et al. 2018). In particular, nurses have high levels of stress that affect the duration of care, personal wellness, and efficiency (Palumbo et al. 2012). Out of 2500 nurses, approximately 75% of them reported working with pain, and nearly 20% also showed depressive symptoms (Steinberg et al. 2017). The implemented strategies to improve the health and wellbeing of nursing staff are important, since their work has a direct effect on patients (S. Zheng et al. 2018). Disturbance in mental health has become the main health concern in society, and tai chi seems a valid tool to solve it (S. Zheng et al. 2018). Tai chi is an ancient Chinese martial art that has attracted growing interest. It is an aerobic exercise of mild to moderate intensity, and its practice involves an interaction of physical movement, meditation, and deep breathing (Zou et al. 2018). As it comprises mental concentration, physical balance, muscle relaxation, and relaxed breathing, tai chi shows a great potential for becoming widely integrated into prevention and rehabilitation interventions for a great number of medical and psychological conditions (Zou et al. 2018). The scientific literature highlights that this discipline improves the quality of life by reducing stress, intervening simultaneously on the mind and body (Love et al. 2019). In fact, the positive effects of tai chi have been widely demonstrated on many pathologies, and the interest in its benefits has exponentially grown along with the number of individuals practicing it (Farhang et al. 2019). During the exercise, an increase in the synthesis of serotonin and dopamine has been demonstrated (Zou et al. 2018); moreover, improvements in the function of the cardiovascular system, type II diabetes, and musculoskeletal disabilities have been recorded (Fetherston and Wei 2011). Due to these effects, its application would be appropriate for healthcare professionals to increase their

mental wellbeing, reduce stress and enhance concentration and relaxation; furthermore, it would impact on their physical functioning, improving muscle tension and joint mobility. However, little is known concerning the efficacy of tai chi in reducing work-related stress among health professionals, and results have not been conclusive (Budhrani-Shani et al. 2016). The aim of this study was to carry out a systematic review of the literature concerning the use of tai chi in reducing stress in health care workers.

Method

Search Strategy

This systematic review was performed on the basis of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement [10]. In order to collect data from the medical, nursing, and scientific literature, the following databases were searched on March 2019: PubMed, Scopus (Elsevier), Cinahl, and Web of Science. Articles were retrieved using the string: "tai chi AND stress AND (health professional OR nurs*)". Backward citation search was performed in order to ensure a wide access to previous scientific evidence that might have not been detected by our search string. Figure 1 illustrates the flow-chart relating to the literature search strategy.

Study Selection

Studies were recruited if they focused on the positive effects of tai chi on the psychophysical wellbeing of the healthcare workers. Studies were included if they were published in English after 1995. No restrictions to study design were applied. The objective of the study was addressed by referring to the PICOS (Population, Intervention, Comparison, Outcome, Study design) questions: The population was identified in health professionals; the intervention in object was tai chi; the comparator was alternative techniques (such as yoga or traditional care); the outcomes were reduced work-related stress, better physical and psychological function (e.g., anxiety, depression), improvement in attention and/or productivity; the study design was pilot studies, observational studies, randomized clinical trials (RCTs), narrative, and systematic reviews.

Studies were assessed for eligibility through a multi-step approach: Screening by title, abstract, and full text. Study selection was performed independently by two different authors and then compared in order to reduce risk of assessment bias. Discrepancies in the evaluation were solved by consensus with a third author.

Data Extraction

Included studies underwent data extraction collecting the following information: First author, country, study design, year of publication, number of participants or number of included studies, outcome. In order to reduce bias from authors, data extraction was performed by two researchers independently, and discrepancies process were solved by consensus with a third researcher.

Quality Assessment

The methodological quality of all studies included in the systematic review was assessed. Quality assessment was performed according to the Newcastle–Ottawa Scale (NOS) on cohort or cross-sectional studies(G. A. Wells et al. 2000), the Jadad scale for randomized clinical trial (Jadad et al. 1996), AMSTAR for systematic reviews (Shea et al. 2007), and CASE REPORT scale for case study (Pierson 2009).

Results

The Identification of Relevant Studies

A total of 111 references were retrieved from the database investigation: 50 in PubMed, 28 in Scopus, 20 in Web of Science, and 13 in CINHAL. After the exclusion of duplicates (39 articles) the remaining 72 references underwent a title and abstract analysis, after which 60 were excluded. After full-text screening, five articles were included in the systematic review: Two clinical trials, one observational study, one systematic review, and one case report. One further clinical trial was identified from the analysis of the bibliographies of selected studies. Table 1 summarizes the characteristics of the included studies.

The study of Kemper and colleagues shows the results of an online survey administered to 342 North American nurses to evaluate their interest in meditation, prayer, and mind–body practices, such as yoga, tai chi, qigong, Zen, acupuncture, etc., in reducing stress. The e-survey included: Demographic characteristics, health conditions and stress levels, experiences with mind–body practices, expected health benefits, training preferences, and will participate in future randomized controlled trials. The authors found a decline of the quality of life with evident dissatisfaction; most of the respondents (73%) reported one or more health conditions, more specifically 49% of

the nurses reported anxiety disorders, 41% back pain, 34% gastrointestinal disorders, and 33% depression. The number of burnout cases was also increasing. These disorders were perceived as a high level of stress, since the assigned value in a scale from 0 to 5 was 4 (0 = none, 5 = extreme stress). Nearly all (99%) reported already using one or more mind–body practices to reduce stress and, among these, yoga/tai chi/qigong practices were the 34% (Kemper et al. 2011). The identified clinical trials are in line with these statistics and describe the effectiveness of these interventions. A pilot study was carried out by researchers in nursing at the University of Vermont (Palumbo et al. 2012) to assess the feasibility of a tai chi workplace wellness program as a cost effective way of improving physical and mental health, reducing work related stress, and improving work productivity among nurses over 49 years of age. Participants were divided in two groups: The tai chi group (n = 6) was asked to attend tai chi classes once a week offered at their worksite and to practice on their own for 10 minutes each day at least 4 days per week for 15 weeks. Controls (n = 5) received no intervention. After 15 weeks, the tai chi group showed an increase of 3% in productivity in the workplace and also an improvement in musculoskeletal pain and a greater reduction in work-related stress (−20% in NSS—Nursing Stress Scale) than the control group (−8.5%, $p = 0.89$). The tai chi group also showed a larger reduction in general stress (−23% in PSS—Perceived Stress Scale) than the control group (−17.5%, $p = 0.42$). Similarly, Steinberg and colleagues investigated the effect of a very short intervention of an eight-week tai chi program on 15 nurses. They found a significant improvement in sleep ($t = -4.01$, $p = 0.007$); stress reduction; and nurse desire to be competent, successful, and compassionate in their work (Steinberg et al. 2017).

Lastly, in 2018, Marshall et al. conducted a trial that consisted of a 12-week intervention of tai chi delivered to 12 healthcare professionals within the same healthcare center in order to encourage their participation and to minimize dropouts. In this study, wellbeing of participants was measured before and after the intervention using the WEMWBS scale. This research also demonstrated a significant increase of the general mental wellbeing of subjects, with a gain of mean score of 4.13 ($p < 0.005$) (Marshall et al. 2018). Moreover, the systematic review of Budhrani et al. shows evidence that, after a 15-week tai chi program on 11 nurses suffering from work-related musculoskeletal disorders, significant improvements in physical and mental health, higher reduction in work and general stress, and improvement in trunk flexibility were seen, compared to the control group (Budhrani-Shani et al. 2016).

However, although the reported studies refer to the nursing population, results of effectiveness are also confirmed in other professionals. For example, Benor in 1995 considered the Louisville program for medical students and showed that nutrition, exercise, and relaxation (muscle relaxation, music, art, song, tai chi and other methods) could play an important role for health maintenance and disease prevention in medical students (Benor 1995).

Quality Assessment

Clinical Trials were of poor quality, achieving zero, one, and three points on the Jadad scale out of five. The observational study and the case report were of average quality, with scores of 5/9 and 7/10, respectively. Low quality was observed in the systematic review (3/11). According to the quality assessment tools, the overall methodological quality is poor–medium level. The application of tai chi to improve health professionals' wellbeing is still limited, and the absence of a standardized intervention (for example, in terms of length and structure of a tai chi session) impacts on the on the scarce methodology of the studies and reduces the robustness of the retrieved evidence.

Discussion

The literature produced to date on this topic is limited. After extensive research on major databases such as Scopus, PubMed, Cinahl, and Web of Science, we were able to find only six useful articles for this systematic review. Following the use of quality assessment tools such as AMSTAR, Jadad, Newcastle–Ottawa Scale, and CASE REPORT, we can say that the methodological quality of the published literature is of a poor level.

Healthcare professions are among the most vulnerable for stress, and this is related to the characteristics of the work, with lack of adequate training, poor social recognition, excessive workloads, and bad organizational strategies (Palumbo et al. 2012). Acute and prolonged stress, if untreated, leads to chronic symptoms that may not react to traditional therapies. For this reason, more and more often, individuals are pushed to undertake alternative non-medical pathways. The use of complementary and alternative medicines (CAMs) represents a useful tool to reduce stress-related chronic pain; among the most used CAMs there are food supplements (39.1%), chiropractic (23.4%), manual massages (23.1%), meditation/yoga/tai chi (20.5%), homeopathic remedies (12.8%), and acupuncture (4.7%) (Ives and Sosnoff 2000),(Chismark et al. 2011), (Wade et al. 2008).

Since 1980, a low level of selfcare has been observed among health professionals, although the exposure of this work category to high risk of mental and physical deterioration has been recognized, so resulting in risky behaviors (alcohol or substances abuse, or suicide). Tai chi and other support techniques could represent valid tools to obtain stress reduction (Benor 1995). From the collected evidence, the positive effects of tai chi on many pathologies have been widely demonstrated, so a great scientific interest in its benefits has exponentially grown; moreover, the number of people who use it to improve their physical and mental health is increasing. A study published in 2018 has shown how tai chi has immediate positive effects on perceived attention and stress. This study compared a control group (n = 20) and an intervention group (n = 20) involved in a 10 minute-per-day tai chi program. Electroencephalogram analysis to assess attention and stress levels was performed for both groups at the beginning, during, and at the end of the study. From the collected data it was noticed that for the tai chi group, the levels of attention increased during the exercises and decreased immediately after the end. The levels of perceived stress after

the exercises were also significantly lower than those at the beginning while among the control group all parameters remained unchanged (Cheung et al. 2018). There are many conditions in which its application could be beneficial: Back pain (41.3%), joint pain or arthritis (37.7%), headache (32.8%), insomnia (27.8%), weight loss (20.9%), hypertension (19.6%), depression (11.0%), osteoporosis (7.3%), cardiac disorders (4.6%), uterine fibroids (3.9%), during pregnancy (49.1%) (Wade et al. 2008). Its positive effect has also been demonstrated in HIV-infected patients, women with early-stage breast cancer, in cardiovascular disease, osteoarthritis, type II diabetes, musculoskeletal conditions, depression, improved sleep and stress (Tsai et al. 2018),(Lorenc et al. 2018),(Robins, Elswick, and McCain 2012); it also appears useful for improving cognitive functions and reducing pain (Tsai et al. 2018). Chan and colleagues compared tai chi exercise with brisk walking in its efficacy for reducing cardiovascular disease risk factors among adults with hypertension. This trial confirms the efficacy of tai chi since, after nine months, a significant reduction in blood pressure (systolic −12.46 mmHg; diastolic −3.20 mmHg), fasting blood sugar (−1.27 mmol/L), glycated hemoglobin (−0.56%), and perceived stress (−2.32 score) were observed. Furthermore, participants showed improved perceived mental health (+3.54 score) and exercise self-efficacy (+12.83 score) (A. W. K. Chan et al. 2018). Tai chi's clinical validity has been demonstrated in more than one field, and it is also easily reproducible as it is a low-risk economic activity with multiple physical and psychological advantages, but a deepening of the studies is now necessary (W. C. Wang et al. 2009). This ancient martial art is an activity that involves both the body and the mind. The physical exercises of body balance are combined with meditation courses focused on breathing (Robins, Elswick, and McCain 2012),(Holmberg and Perdue 2013); this synergy favorably predisposes to concentration by temporarily diverting attention from the stress of daily life.

The weaknesses of this analysis are undeniably related to the low numerical consistency of studies present in the literature and, at the same time, to the heterogeneity of the interventions that result in a difficulty to make any comparison. The studies included in this review are relatively recent but of poor quality.

Conversely, the strengths of this study are represented by the revolution that this type of approach brings for the management of healthcare workers, as the costs for implementing them are low in comparison to the potential health benefits.

Conclusions

According to the published literature, tai chi represents a valid tool to improve many pathological conditions, and it could reduce work-related stress as well. Although present data highlight the full potential and possible benefits derived from these techniques, in order to warrant a widespread diffusion, it would be necessary to further deepen scientific evidence by designing and implementing research studies that could confirm tai chi's beneficial effects for the wellbeing of healthcare professionals.

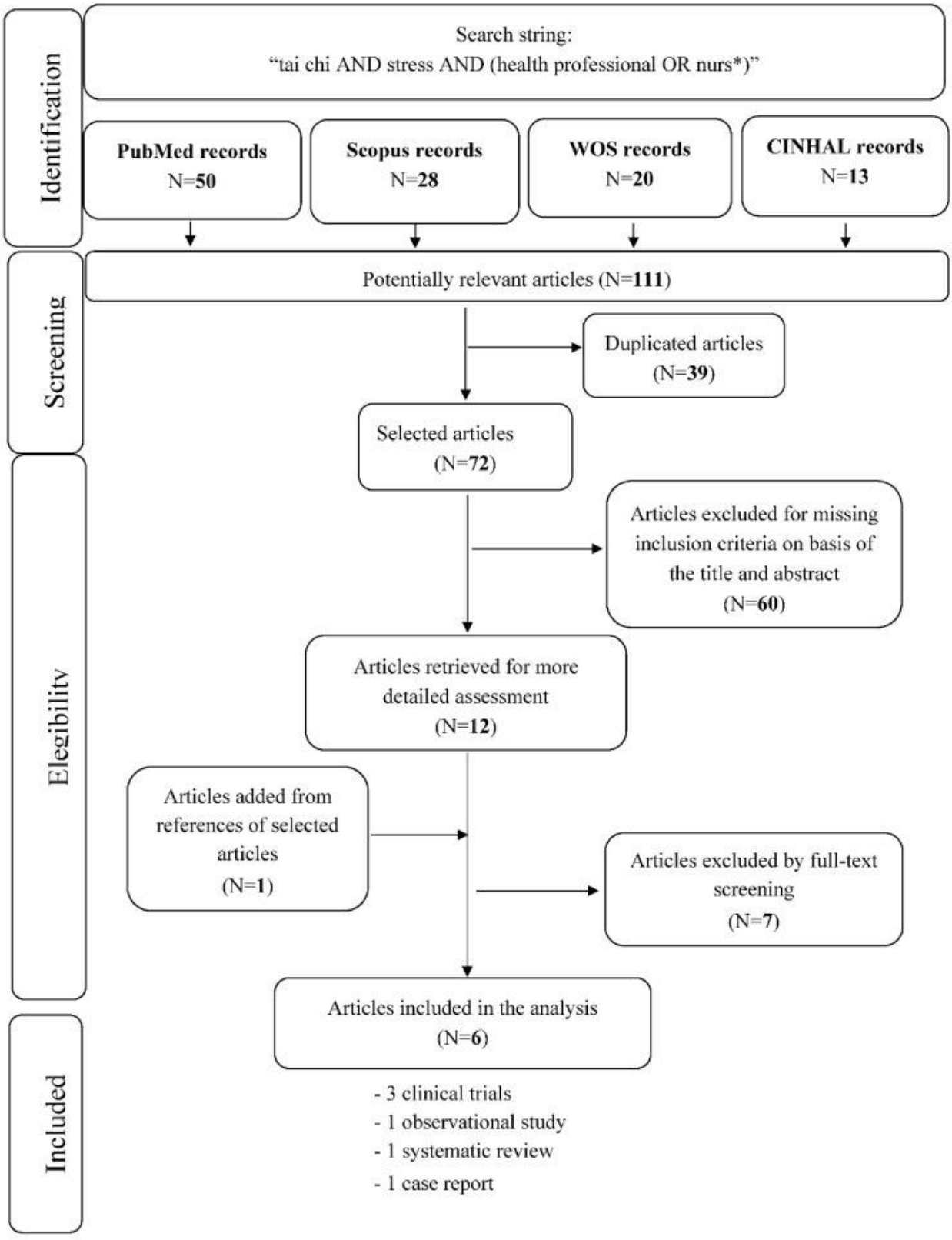
Table 1 Characteristics of the included studies

Authors	Country	Study Design	Number of Participants or Number of Paper Included	Year of Publication	Results	Quality Assessment
Benor D.J	UK	Case report	Not applicable	1995	This study identified nutrition, exercise, relaxations (including music, art, and tai chi) as important methods for health maintenance and disease prevention among medical students.	7/10 *****
Kemper K et al.	USA	Observational study	342	2011	Mind–body practices including meditation, prayer, yoga, tai chi, and qigong to reduce stress and anxiety in nurses.	5/9 *
Marshall D et al.	Ireland	Clinical Trial	12	2018	A 12-session intervention of tai chi was administered to a group of healthcare workers. A significant increase in	0/5 ***

Authors	Country	Study Design	Number of Participants or Number of Paper Included	Year of Publication	Results	Quality Assessment
					these individuals' wellbeing was measured comparing pre- and post-intervention measurements.	
Palumbo M et al.	USA	Clinical Trial	14	2012	The tai chi group registered significantly fewer absence rates and 3% increase in productivity. No significant differences in physical or mental health scores (SF-12) were detected.	1/5 ***
Steinberg B et al.	USA	Clinical Trial	15	2017	A very short intervention resulted in significant improvements in sleep quality, stress levels, and nursing staff's motivation in their work.	3/5 ***

Authors	Country	Study Design	Number of Participants or Number of Paper Included	Year of Publication	Results	Quality Assessment
Budhrani-Shani P et al.	USA	Systematic review	83	2016	After a 15-week tai chi program, significant improvements in physical and mental health were recorded, along with a significative reduction in stress levels were highlighted and an improvement in trunk flexibility.	3/11 **

*** Newcastle–Ottawa Scale, ** AMSTAR scale, *** Jadad scale, ***** CASE REPORT.**


Identification
Search string:
"tai chi AND stress AND (health professional OR nurs*)"
PubMed records
N=50
Scopus records
N=28
WOS records
N=20
CINHAL records
N=13
Screening
Potentially relevant articles (N=111)
Duplicated articles
(N=39)
Selected articles
(N=72)
Eligibility
Articles excluded for missing inclusion criteria on basis of the title and abstract
(N=60)
Articles retrieved for more detailed assessment
(N=12)
Articles added from references of selected articles
(N=1)
Articles excluded by full-text screening
(N=7)
Articles included in the analysis
(N=6)
Included
- 3 clinical trials
- 1 observational study
- 1 systematic review
- 1 case report

Chapter 8

Summary

Summary

Any physiological action involving skeletal muscles that requires the expenditure of energy is termed physical exercise. Physical activity may be measured using a variety of methods, including behavioral observation and self-report, as well as motion sensors. Some physical activities can result in a variety of different physical effects. Running and cycling, for example, improve aerobic fitness and stamina; weight training and resistance bands, on the other hand, improve muscle strength. Flexibility and balance are improved through yoga and stretching activities. Any type of physical activity can be classified as exercise. It's a part of our day-to-day lives. In other words, exercise is a subset of physical activity. Exercise is defined as planned, structured, and repetitive physical activity. It is frequently associated with the maintenance or improvement of physical fitness.

According to the World Health Organization "Health is a condition of total physical, mental, and social wellbeing, not only the absence of disease or infirmity,". Physical health is defined as having an appropriate body weight, height, and circumference for one's age and gender, as well as having an acceptable degree of eyesight, hearing, locomotion or motions, and a pulse rate, blood pressure, and respiration rate. Mental health problem is one of the worldwide public health. Mental health is defined as a condition of well-being in which a person recognizes and appreciates his or her own potential. Physical activity on a regular basis is beneficial to both individual and public health. It is good for health and fitness. Besides from that, regular physical activity and exercise are correlated to a longer and better quality of life, a lower risk of a variety of diseases, and a slew of psychological and emotional advantages. Physical exercise appears to have a beneficial relationship with a variety of factors that impact physical health, including diabetes, blood pressure, and the ability to metabolize fat for energy. physical activity could reduce the risk of chronic diseases. Physical activity is considered safe for adults living with the selected chronic conditions without contraindications, and the benefits generally outweigh the risks. Also, regular activity beginning in childhood helps to improve bone health. Physical activity and regular exercise are essential for people of all ages to maintain their physical and mental health. Physical activity can help you maintain your independence as you age by allowing you to continue doing the activities you like. Physical activity and exercise are vital components of a healthy lifestyle, and recent research has related regular physical activity and exercise to a variety of physical and mental health advantages.

Physical inactivity is currently recognized as the fourth greatest risk factor for growing mortality and the threat of numerous communicable diseases as a result of globalization. It is well accepted in this context that regular physical activity and exercise lessens the risk of premature mortality.

In the developed world, inactivity is one of the leading causes of mortality, disability, and impaired quality of life. Physical inactivity has become a major public health threat because currently approximately 28% of adults aged 18 and over were not engaged in any physical activity in 2016 (men 23% and women 32%). This means they do not meet the global recommendations of at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity physical activity per week. Knowledge of physical activity guidelines is important if people are to participate in an appropriate amount to achieve health benefits. The World Health Organization (WHO) recommend adults do at least 150min per week of moderate intensity aerobic physical activity or at least 75min of vigorous intensity aerobic physical activity throughout the week, or an equivalent combination of moderate and vigorous intensity activities. It is also recommended that muscle strengthening activities involving the major muscle groups be performed at least twice a week. Regular physical exercise has been demonstrated to reduce morbidity and mortality by lowering the risk of heart disease, diabetes, high blood pressure, variety of cancer of cancer, depression/anxiety, and excess weight, while also promoting the development and maintenance of healthy bones, muscles, and joints. Physical inactivity, a high-fat diet, alcohol consumption, and smoking were all found to be risk factors for Alzheimer's disease. Previous research has demonstrated that physical activity can help older people improve their health by slowing or preventing the functional decline that comes with age. More studies found a significant improvement in memory and improve brain function among middle-aged trained individuals, compared to sedentary subjects. Physical exercise increases endorphin synthesis, which improves mood and acts as a natural pain reliever while also lowering stress hormones like adrenaline and cortisol. Physical activity or exercise routines influences on emotional well-being and as part of lifestyle that help to reduce the negative impact of aging on the body and mind. Exercise is seen as the first step in changing one's lifestyle to avoid and manage chronic diseases. Exercise and physical activity in modern society has begun to gain great importance in the development of quality of life and life expectancy. Regular physical exercise can lead to physiological adaptations in areas including stroke volume, resting heart rate, blood pressure, and cardiac output, which can lead to improvements in cardiorespiratory and musculoskeletal performance, which can enhance HRQoL.

In this thesis, we made an effort to address different public health aspects of physical activity in different population groups. We chose to focus this thesis on specific types and domains of physical activity such as Curves, Pilates, Mind-body exercise (Tai chi, Qigong, Yoga), and adherence to the physical activity guideline. With respect to health outcomes, we concentrated on Alzheimer's disease, Breast cancer, Obesity, Low back pain, and health-related quality of life, lifestyle, and life expectancy.

Main findings

Table 8.1 summaries the main findings for each chapter described in this thesis. The cross sectional study in Iran and Pilot study in Italy assessed physical activity, lifestyle, life expectancy and quality of life in patients with Alzheimer's disease. The Participants were Alzheimer patients who located in stage 1 or 2 of this disease. The short version of the International Physical Activity, Miller & Smith Lifestyle, Schneider Life Expectancy and QUALITY OF LIFE (WHOQOL) -BREF Questionnaires were completed by all subjects (chapter 2), we found low to moderate intensity exercise has beneficial effects on lifestyle and quality of life in people with Alzheimer's, however, the effects of moderate-intensity exercise are more favorable than low-intensity exercise. We studied reliability and validity of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires (chapter 3) in 18 Italian patients with Alzheimer . We found that the lifestyle scale had high overall internal consistency, and the Cronbach's α coefficient for the total 20-item scale was 0.80 in the Italian population. About life expectancy result was in a high overall internal consistency of 0.93. We concluded that these questionnaires are useful tool for monitoring physical lifestyle and lifestyle expectancy levels in Italy. Our research (chapter 4) among eighty women with age between 30 to 40 years was one of the first examining the evaluate the effectiveness of the curves program and High-Intensity Interval Training in healthy women. They participated over a period of six months. BMI, body fat, the fat mass percentage were calculated by OMRON body fat 306 TM at baseline and the end of the intervention. The results between high-intensity interval training and curves show that curves scores were significantly lower among Interval training. after 6 months the most impact was on "Abdomen loss "in Curves Group Mean(SD) = -4.48(1.70). According to the multivariate analysis, we can say that for all the dependent variables Weight loss

-0.320 (<0.001), Trunk loss -0.376 (<0.001), Abdomen loss -0.276 (<0.001), Hip loss -0.302 (<0.001), Lower arm loss -0.248 (0.003) and Fat mass loss -0.153 (0.061) the curves group shows significant results in comparison with the high-intensity interval training group ($p < 0.001$) while the civil status is significantly associated with only "Upper arm loss" variable ($\beta = -0.357$; $p < 0.001$). Furthermore, our umbrella review of systematic reviews and meta-analyses follow-up study among patients with breast cancer (chapter 5) and our systematic review including 6 observational studies (chapter 7) showed that mind body exercise Tai Chi and Qigong was strongly related to decrease stress and fatigue. Based on our results, it seems that Tai Chi and Qigong have shown potential as supportive therapies in the treatment of cancer-related fatigue and improving the quality of life among patients with breast cancer. Moreover, our follow-up study (chapter 7) showed that Tai Chi represents a valid tool to improve many pathological conditions, and it could reduce work-related stress as well. Finally, our umbrella review of systematic reviews and reviews study among patients with chronic low back pain (chapter 6) was determined the effects of the Pilates method-exercise on these patients. According to the published literature, there was pain relief and functional improvement from the Pilates-based exercise intervention in the short term in people with chronic low back pain. There was strong evidence that Pilates exercise improved flexibility and dynamic balance and enhanced muscular endurance in healthy people in the short term. For body composition, there was some evidence that Pilates exercise may be effective in reducing body fat and increasing fat-free mass in the short term.

Conclusion

Physical activity reduces the risk of several chronic diseases and premature death and is also safe if properly planned for adults living with chronic conditions. The outcome of our study regarding the reliability and validity of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires in the Italian population based on our study on physical activity among patients with Alzheimer's in Italy shows that the Italian versions of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires demonstrated good psychometric properties and good characteristics of factorial validity for future epidemiological studies aimed at evaluating lifestyle and lifestyle expectancy in the Italian population and can as well be used in clinical practice and research. The outcome of our study examining the effectiveness of the curves program and high-intensity interval training (HIIT) in healthy women shows that the "Curves" program improved muscle strength, fat loss, and fat mass reduction more than high-intensity interval training. The findings of this thesis reveal that regular physical activity and exercise lead to improved health and wellbeing.

Table 8.1 Main finding of the chapters described in this thesis

chapter	Aim	Study Population	Conclusion
2	Investigate the lifestyle, life expectancy, and quality of life of Alzheimer's patients with a physical activity approach	**Iran** N= 85 , Age= up to 60 **Italy** N= 25 , Age= up to 60 **Alzheimer patients**	Low to moderate intensity exercise has beneficial effects on lifestyle and quality of life in people with Alzheimer.
3	Evaluate the reliability and validity of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires in the Italian	N= 18 , Age= up to 60 **Alzheimer patients**	The outcome of our study shows that the Italian versions of the lifestyle (Miller-Smith) and life expectancy (Schneider) questionnaires demonstrated good psychometric properties and good characteristics of factorial validity for future epidemiological studies aimed at evaluating lifestyle and lifestyle expectancy in the Italian population and can as well be used in clinical practice and research.
4	Examine the effectiveness of the curves program and High-Intensity Interval Training (HIIT) in healthy women	N= 80 , Age= 30-40 **Healthy women**	The "Curves" program improved strength muscles, loss of fat, and fat mass reduction more than High-Intensity Interval Training.
5	Identify the effects of Tai Chi and Qigong on quality of life and fatigue among patients with breast cancer. **(An umbrella review of systematic reviews and meta-analyses)**	Nine systematic reviews and meta-analyses **Patients with breast cancer**	Tai Chi and Qigong have shown potential as supportive therapies in the treatment of cancer-related fatigue and improving the quality of life among patients with breast cancer. However, there is moderate evidence indicating that Tai chi and Qigong reduce fatigue and improve health-related quality of life among patients with breast cancer

6	Determine the effects of the Pilates Method-exercise on patients with chronic low back pain. **(Umbrella review of systematic reviews and reviews)**	Eleven systematic reviews and reviews **Patients with chronic low back pain**	There was pain relief and functional improvement, improved flexibility and dynamic balance and enhanced muscular endurance from the Pilates-based exercise intervention in the short term in people with chronic low back pain. In addition, it has been effective in reducing body fat and increasing fat-free mass in the short term
7	Perform a systematic review of the scientific literature concerning the relationship between tai chi practice and wellness of health care workers (HCW) in their professional setting **(Systematic review)**	Six systematic reviews **Health care workers**	Potential impact of interventions such as tai chi as tools for reducing work-related stress among healthcare professionals

Abbreviation

Physical Activity (PA)

Physical Exercise(PE)

Physical Fitness(PF)

Maximum Heart Rate (maxHR)

World Health Organization (WHO)

Metabolic Equivalent Task (MET)

Cardiovascular Diseases (CVDs)

Blood Pressure (BP)

Body Mass Index (BMI)

Triglyceride (TG)

Health Related Quality of Life (HRQoL)

Mild Cognitive Impairment (MCI)

Alzheimer Disease (AD)

Mild Cognitive Impairment (MCI)

Non Communicable Diseases (NCDs)

Insufficient Physical Activity (IPA)

Multiple Sclerosis (MS)

Spinal Cord Injury (SCI)

Parkinson's Disease (PD)

Schizophrenia (Sz)

Unipolar Depression (UD)

High-Intensity Interval Training (HIIT)

Low Back pain (LBP)

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