



Effect of Aquatic Exercises on Emotional Intelligence and Quality of Life of Inactive Veterans

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ABSTRACT

Aims This research aimed to investigate the effects of eight weeks of aquatic exercises on the emotional intelligence and quality of life of inactive veterans of Ilam City.

Materials & Methods This quasi-experimental study utilized a pre-test-post-test design with a control group and its statistical population was all veterans in Ilam City, from which a sample of 28 individuals was selected using available and voluntary sampling methods. The samples were divided into the experimental (n=14) and control (n=14) groups. The library method was employed to collect the background and theoretical foundations of the research and two standard emotional intelligence questionnaires including Bar-On (2002) and Quality of Life (2000) were used to gather data. For data analysis, univariate and multivariate analysis of covariance with SPSS 24 was employed.

Findings Before the intervention, there were no significant differences in emotional intelligence and quality of life between the experimental and control groups, and the groups were homogeneous. However, after the exercise intervention, improvements in emotional intelligence and quality of life were observed in the experimental group compared to the control group ($p \leq 0.05$). Thus, aquatic exercises had a significant impact on enhancing emotional intelligence and quality of life in the experimental group.

Conclusion Aquatic exercises lead to improvements in emotional intelligence and quality of life in veterans.

Keywords Emotional Intelligence; Exercise; Veterans; Quality of Life

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Introduction

War is a type of armed, intentional, and widespread struggle between political societies, which can be considered a form of political violence. War is one of the important and influential factors contributing to physical, psychological, and behavioral disorders because it exposes individuals to extremely risky conditions [1]. Iran's last war was with Iraq, which began in 1980 due to the greed of the ruling regime in Iraq at that time and ended in 1988. This war caused irreparable damage to both countries. According to a report from the Martyrs Foundation of Ilam Province, during this war, 2,695 people were martyred, and 8,848 became injured veterans in the province, of whom more than 1,200 are veterans with over 25% disability. Disabled veterans are divided into five groups based on the type of disability: neurological and psychological, special, amputee, chemical, and combined. This classification is based on various injuries, such as limb amputation and psychological and psychiatric injuries caused by explosions and chemical weapons. Most veterans have physical and mobility disabilities, as well as psychological disorders, such as loneliness, anxiety, depression, lack of emotional control, identity crisis, boredom, low emotional intelligence (EI), unfavorable quality of life (QoL), aggression, communication difficulties, and family problems [2].

One of the most important traits that can help veterans respond to environmental changes is EI. EI is a field that seeks to explain and interpret the role of emotions and feelings in human abilities [3]. It is one of the most significant human abilities that affects all aspects of an individual's life, including personal life and interpersonal relationships [4]. In the past, intelligence quotient (IQ) was considered the standard for measuring intelligence and learning ability. However, it has become evident that many individuals who scored high on IQ tests were not very successful in family and work environments; conversely, individuals with lower IQ scores were often more successful and adaptable in the workplace [5]. Therefore, it can be inferred that what leads to success and adaptability is EI and the ability to establish broad social relationships [5, 6]. Mayer *et al.* believe that EI is a type of psychological capacity for making sense of and applying emotional information, encompassing awareness, regulation, and the correct expression of a range of emotions [7]. Tanhamira *et al.* consider EI to be the intersection of advanced abilities and skills in accurately recognizing oneself and one's personal strengths and weaknesses, maintaining healthy and effective relationships, working productively with others, and effectively and healthily handling the demands and pressures of daily life [8]. EI involves understanding one's own emotions and those of others, responding appropriately to emotions and behaviors, recognizing inner states, and expressing emotions in

an appropriate manner [9]. Individuals have varying capacities for EI, with some being average and others being highly skilled. According to Mayer *et al.*, part of this capacity is instinctual, while another part is learned through education and life experiences, which can be enhanced through effort, practice, and experience. Learning life skills leads to the strengthening of EI [7]. People with well-developed EI understand themselves and others better and are more successful in making friends, working, and marrying [4]. In other words, an individual with high EI can effectively manage their emotions and express them appropriately. Such an individual, due to their strong sense of empathy and good control over their emotions, is more successful in interpersonal relationships and, as a result, has better opportunities and circumstances in life [3]. When research examines a job or profession to determine what factors enhance individuals' performance and what keeps it steady or hinders their progress, EI is found to be a stronger predictor than general intelligence [3]. According to Goleman, IQ accounts for at most only 20% of success, with 80% depending on other factors. In many situations, a person's fate is determined by intrapersonal components and skills that form EI, such as emotional self-awareness, assertiveness, self-esteem, self-actualization, and independence [10]. EI, through improved management of emotions and feelings, enhances the QoL for veterans. Mikaeili *et al.* found a significant negative relationship between the social adjustment of veterans with post-traumatic stress disorder and EI [11]. Bazvand *et al.* showed that sports exercise improves EI in individuals, with traditional and small-field games being particularly effective due to their nature [12]. Morales-Sánchez *et al.* analyzed 21 articles and concluded that EI significantly affects the QoL, psychological well-being, depression, anxiety, resilience, and mental health of breast cancer patients [13].

Today, with the increase in life expectancy, an important issue has emerged regarding how to spend one's life, or in other words, the QoL. Veterans' lives are often accompanied by reduced physical function, movement limitations, increased health problems, and dependency on others, all of which can negatively impact their QoL. QoL is one of the fundamental concepts related to mental health. By improving QoL, mental health can also be enhanced [14]. QoL refers to a sense of satisfaction or dissatisfaction with various important aspects of life, encompassing psychological, social, economic, and family domains [15]. The concepts used to understand QoL include satisfaction and dissatisfaction, living conditions and quality, happiness and unhappiness, life experiences, and factors such as comfort, functional status, socio-economic status, independence, and environmental conditions [14]. QoL is a complex, multidimensional construct determined by an individual's assessment

of their status in physical, psychological, and social domains [16]. Therefore, QoL is no longer defined as the absence of disease, disorder, or disability; rather, it refers to the inner satisfaction and sense of well-being a person feels about different areas of their life [17]. Reviewing the multiple concepts of QoL has led to a definition provided by the Quality-of-Life Group of the World Health Organization. In this definition, QoL is a comprehensive concept that includes physical health, personal growth, psychological states, level of independence, social relationships, and interaction with the environment, based on an individual's perception of these dimensions. Isanejad and Haydarian showed that resilience training can have a stable and lasting impact on improving the QoL and resilience of freed prisoners [14]. Khaniabad *et al.* indicated that teaching spiritual attitudes and health-related behaviors, as well as increasing services from the Martyrs Foundation, can enhance the QoL for veterans with mental health issues [18]. Sadeghzadeh *et al.* stated that the QoL for patients with obsessive-compulsive disorder is influenced by metacognitive therapy [19]. Seddighmokhtari *et al.* showed that eight weeks of corrective exercise significantly affect the QoL for amputee veterans [20]. According to Silva *et al.*, the perceived EI of burn unit patients is influenced by their QoL [21].

Nowadays, due to the positive effects of physical activities and sports on many diseases, engaging in sports activities is recommended for patients. On the other hand, because of the side effects of medications, their high costs, and the lack of definitive treatment for certain diseases, non-pharmacological treatment methods such as physical activities and sports have gained attention from patients and therapists. Sports activities, as a complementary treatment, are an economical, accessible, non-invasive method used in clinical approaches that serve as a strategy for pain management and the treatment of physical and mental disorders [22]. There are various types of sports exercises, each of which follows specific goals. Many veterans are unable to perform sports exercises on land due to limitations, movement, and skeletal disabilities, as well as joint pain. Therefore, in order to maintain and increase mobility and strengthen muscles, it is better to train in water. Sports exercises in water, due to features, such as buoyancy, reduced inflammatory responses, decreased pressure on joints, isokinetic contractions, hydrostatic pressure, adhesion, and increased sensory feedback and proprioception, lower the risk of falls and fractures, promote mental relaxation and pain relief, enhance and maintain the range of motion, and reduce depression and anxiety in individuals. Thus, it can be an effective exercise method for veterans [23, 24]. On the other hand, aging and a prolonged sedentary lifestyle resulting from inactivity in veterans lead to a rapid and severe weakening of the skeletal muscle system (sarcopenia), the occurrence of mental and

psychological problems, a decrease in QoL and hope, accumulation of fat and obesity, and a weakened immune system, making them susceptible to various diseases and even death [1]. Jani *et al.* have stated that sports exercises and physical training in water can reduce fatigue and improve individual performance in men with multiple sclerosis [22]. Zaravar *et al.* showed that physical exercises in water increase the secretion of growth hormone, insulin-like growth factor 1, and bone metabolism in elderly women [25]. Rezaei *et al.* found that aquatic exercises significantly affect insomnia and alexithymia in veterans in Ilam City [26]. O'Dwyer *et al.* pointed out that physical activities are not only beneficial for the elderly with skeletal disorders and diseases but also that engaging in specific physical activities speeds up recovery and improves their QoL [27]. Ávila-Gámiz *et al.* showed that sports and mental exercises have a positive and significant effect on the neurogenesis of hippocampal neurons in the brain [28]. Gabour *et al.* in Canada demonstrated that continuous physical exercise significantly impacts the EI of children aged 10 to 13 [29].

The review and summary of the literature on the subject showed that the social life of veterans is affected by various mental, physical, and skeletal disorders, and sports activities can be one of the most beneficial interventions in this area. Furthermore, it appears that aquatic exercises improve body control and help veterans perform a wide range of daily physical activities without injury. Therefore, considering the importance of QoL and the health of veterans, this research was conducted to investigate the effects of eight weeks of aquatic exercises on EI and QoL of inactive veterans in the city of Ilam.

Materials and Methods

The present semi-experimental research employed a pre-test-post-test design with a control group, and was carried out in the spring of 2023. The statistical population consisted of all non-athlete veterans with over 25% disability (inactive) in Ilam City, of whom 28 individuals were selected using an available and voluntary sampling method and divided into the experimental and control (n=14 per group) groups. The inclusion criteria included non-athlete veterans with over 25% disability in Ilam City, while the exclusion criteria included a history of cardiovascular and respiratory diseases (acute myocardial infarction, asthma), neurological disorders (stroke, paralysis, Parkinson's disease), spinal deformities, severe lower limb disabilities, skin diseases, smoking, unmarried status, regular sports activities, failure to complete the questionnaires, and absence for more than two sessions. A library method was used to collect the background and theoretical basis of the research, and three standard questionnaires were used to collect data.

Table 1. Summary of exercises in water (second stage)

Session description	Exercises	Set and repetition
Introductory Session	Pre-test In this session, the objectives and methods of the research were explained to the participants from beginning to end, and they also completed a written informed consent form with full awareness. Then, the pre-test was conducted using the demographic questionnaire, the Bar-On Emotional Intelligence Scale (2002), and the Quality of Life Scale (2000).	
Endurance exercises	Week 1 -Walking 200-300m, skipping, jumping, and leaping in different directions -Walking and running sideways with variations in hand movements (butterfly-like movements) -Cycling movements -Team water games (tug of war, volleyball, water splashing, etc.)	3×16-20
Resistance exercises without weight	Week 2 -Front thigh muscle exercises with a straight and stable spine (thigh joint flexion and knee joint extension) -Back thigh muscle exercises with a straight and stable spine (thigh joint extension and knee joint flexion) -Upper body muscle exercises (elbow flexion and extension, lower back flexion and extension, shoulder abduction and adduction, head flexion and extension, wrist flexion and extension) -Squats in water with a knee joint angle of 60 degrees	3×14-18
	Week 3 -External thigh muscle exercise: Abduction of the hip joint with a straight and stable spine. -Internal thigh muscle exercise: Adduction of the hip joint (returning from abduction) with a straight and stable spine -Upper body muscle exercises: Elbow flexion and extension, lumbar flexion and extension, shoulder flexion and extension, lumbar rotation, and supination and pronation of the forearm -Scott exercise in water: Performed with a 90-degree angle at the knee joint -Plantar flexor exercise: plantar flexion -Dorsiflexor exercise	3×14-18
	Week 4 -Upper body muscle exercises: Abduction, adduction, flexion, extension, and lateral rotation of the shoulder; lumbar rotation; and lateral flexion of the neck -Scott exercises in water with a 90-degree Angle at the Knee Joint	3×14-18
	Week 5 -Anterior thigh muscle exercises with sponge pads and water weights (hip joint flexion and knee joint extension) -Posterior thigh muscle exercises with sponge pads and water weights (knee joint flexion and hip joint extension) -Upper body muscle exercises with a barbell and water dumbbells (elbow flexion and extension, lumbar flexion and extension, shoulder abduction and adduction, head flexion and extension, wrist flexion and extension) -Squats in water with a water barbell, maintaining a 60-degree angle at the knee joint -Outer thigh muscle exercise with sponge pads and water weights (hip abduction with a straight spine)	3×8-12
Resistance exercises with weights	Week 6 -Inner thigh muscle exercise with sponge pads and water weights (hip adduction with a straight and stable spine) -Upper body muscle exercises with dumbbells and water wristbands (abduction, adduction, flexion, extension, shoulder rotation, waist rotation, lateral flexion, and extension of the head) -Squat in the water with water dumbbells and a 90-degree knee joint angle -Lower body triple flexion exercises (hip, knee, and ankle joints) with water resistance bands -Plantar flexor exercises: Plantar flexion with water resistance bands.	3×8-12
	Week 7 -Upper body exercises: Using a barbell and water dumbbells for elbow flexion and extension, lumbar flexion and extension, shoulder adduction and abduction, head flexion and extension, and wrist flexion and extension. -Water squat: Performed with a water barbell and a 90-degree knee joint angle	3×8-12
	Week 8 -Dorsiflexors exercise with water wristbands -Upper body muscles exercise with barbell and water dumbbells	3×8-12
Farewell session	Post-test In this session, the participants were appreciated for their cooperation and regular attendance in the training sessions, as well as their participation in this research. In the end, the post-test was conducted using the demographic questionnaire, the Bar-On Emotional Intelligence Scale (2002), and the Quality of Life Scale (2000)	

1- Demographic questionnaire: This general questionnaire included four questions about age, education, income, daily sports activity level, and marital status, aiming to collect general population data from the sample.

2- Bar-On Emotional Intelligence Scale (2002): This questionnaire consists of 133 questions, with a 90-question version available in Iran. It includes 15 subscales grouped into five main areas, including intrapersonal, interpersonal, adaptability, stress management, and general mood. Responses are rated on a five-point Likert scale (strongly agree, agree, somewhat disagree, and strongly disagree). Higher scores on this scale indicate higher EI. The maximum

score is 450, and the minimum is 90. The validity and reliability of the questionnaire have been confirmed by Dana *et al.* [30]. Additionally, in this research, the face and content validity of this tool were confirmed by six expert professors, and its reliability was established with a Cronbach's alpha of 0.88.

3- Quality of Life questionnaire (2000): The World Health Organization designed this 26-question questionnaire in 2000. It includes four dimensions, namely physical health (seven questions), psychological health (six questions), social relationships (three questions), and living environment (eight questions), each rated on a five-point Likert scale from one (very poor) to five (very

good). The first two questions are general and do not belong to any of these dimensions, providing an overall indication of health and QoL. The highest possible score is 130, and the lowest is 26, with questions 3, 4, and 26 scored in reverse. Higher scores indicate a higher QoL. The validity and reliability of the questionnaire were confirmed in studies by Khalili-Basseri *et al.* and Salehi & Khoshlahjeh Sedgh^[31, 32]. In this study, the face and content validity of this tool were also confirmed by six expert professors, and its reliability was established with a Cronbach's alpha of 0.80.

Summary of exercise sessions in water

In the present study, exercise sessions in water were conducted for eight weeks, with three sessions per week (Saturdays, Mondays, and Wednesdays). Each session lasted 70 minutes and was conducted with the experimental group by a specialized coach at the covered pool of Issar (Veterans) in Ilam City. During this period, the control group continued with their normal activities and did not participate in any specific exercise program. The water temperature in the pool ranged from 26 to 28°C, and the water depth ranged from 130 to 150cm. To adhere to ethical considerations, the research objectives and methods were explained to the participants in the introductory session (pre-test), and they also completed a written informed consent form with full awareness. The water exercise protocol consisted of three stages. Stage 1 was adaptation to the water environment and warm-up, which included walking in water and stretching exercises (10 minutes). Stage 2 included endurance and resistance exercises gradually increasing in intensity (45-65% of maximum heart rate) and repetitions (50 minutes). Stage 3 included cool-down, which included deep breathing, walking in water, muscle relaxation in a floating position, and stretching exercises (10 minutes; Table 1).

Statistical analysis

Data were analyzed using descriptive statistical indices (frequency distribution tables, mean, and standard deviation) and inferential statistics (univariate and multivariate analysis of covariance tests) with SPSS 24 software. Additionally, the results of the normality test indicated that the skewness and kurtosis coefficients of all research parameters fell within an acceptable range (-2 to +2); therefore, it can be inferred that the data distribution was normal.

Findings

The average age of veterans in both the experimental and control groups was 56.40±5.11 years. Among them, 17 individuals had a bachelor's degree or lower, nine individuals had a master's degree, and two individuals had a PhD. Additionally, none of them engaged in regular sports activities (Table 2). The experimental group showed a significant difference

between average scores of EI and QoL in the pre-test compared to the post-test, highlighting the impact of aquatic exercises on these parameters for veterans.

The results of Levene's test ($p>0.05$) indicated that the significance levels of EI and QoL were greater than 0.05. Thus, the homogeneity of variances between the groups was established, and parametric tests were used to analyze the hypotheses. The results of the linear relationship test (assuming linearity in the analysis of covariance) between the covariates (pre-test) and the dependent parameters were significant. Furthermore, the results of the slope homogeneity of regression for the dependent parameters were consistent at a 5% error level. The results of the homogeneity Chi-square (χ^2) test indicated no difference in the distribution of (testable) subjects in terms of demographic parameters in both the pre-test and post-test groups ($p>0.05$). Additionally, the results of Box's M test for examining the equality of the covariance matrix of the EI and QoL between the experimental and control groups showed that the covariance matrix of the EI and QoL in the two groups was equal ($p=0.502$, $F=1.958$, and Box's $M=26.31$).

To examine the effect of aquatic exercises on EI and QoL, both multivariate analysis of covariance (MANCOVA) and ANCOVA were used. Values higher than the average indicated that the group averages were relatively different from each other. Therefore, aquatic exercises created a significant difference in at least one of the two EI and QoL. This means that this intervention improved the levels of at least one of these parameters.

Finally, we analyzed the effect of the intervention on each of these parameters separately using ANCOVA, which indicated that, after adjusting for the effect of EI scores as a covariate, the main effect of aquatic exercises on EI remained statistically significant (partial $\eta^2=0.52$, $p\leq 0.001$, $F_{1, 26}=3.890$). This means that aquatic exercises had a significant impact on EI. The results of ANCOVA indicated that, after adjusting for the effect of QoL scores as a covariate, the main effect of sports exercises in water on QoL in the post-test remained statistically significant (partial $\eta^2=0.58$, $p\leq 0.0001$, and $F_{1, 26}=57.855$). This means that sports exercises in water had a significant impact on QoL.

Table 2. Participants' emotional intelligence and quality of life scores

Parameter	Group	Stage	Score range	Mean
Emotional Intelligence	Experimental	Pre-test	92-361	221.14±6.45
		Post-test	144-395	290.78±4.88
	Control	Pre-test	95-355	225.33±7.91
		Post-test	94-361	230.11±6.11
Quality of Life	Experimental	Pre-test	37-79	67.20±3.44
		Post-test	61-102	92.54±2.12
	Control	Pre-test	34-82	66.97±3.52
		Post-test	36-85	71.21±3.32

Discussion

This research aimed to examine the impact of eight weeks of aquatic exercises on EI and QoL among inactive veterans in Ilam City. Nowadays, the positive effects of sports activities on health as a non-pharmacological approach are well-known. However, the biological mechanisms underlying the effects of aquatic exercises on psychological parameters are still unknown and not easily analyzable or interpretable. When considering the impact of aquatic exercises, it should be noted that the buoyancy of water and its higher density compared to air reduce pressure on joints, create greater resistance to movement, and consequently engage muscles more, requiring more energy expenditure compared to exercise on dry land. This can provide a suitable and safe environment for everyone, especially veterans [23]. Furthermore, aquatic exercises allow veterans to engage in a wide range of activities without the risk of falling or serious injury, which can contribute to improving the quality of exercise and increasing motivation and effort [22].

The lives of veterans have unique characteristics. Given this, ensuring and maintaining the mental health and well-being of veterans is a top priority for officials. EI has garnered significant attention from behavioral scientists. It encompasses the ability to understand and manage emotions effectively. Researchers associate skills, such as relaxation, positive thought control, self-regulation, mental imagery, concentration, and energy control—largely aligned with EI—with physical activities [33]. The inferential results of this study showed that aquatic exercises have a significant impact on the EI of veterans in Ilam City. This finding is consistent with the results of MoradPour [34], Razaghi *et al.* [35], Shirvani *et al.* [36], Berastegui-Martínez *et al.* [37], and Gabour *et al.* [29], but inconsistent with the results of Bashiri *et al.* [38]. The reasons for this discrepancy could include the type and level of training programs, demographic parameters, nutrition and diet, and training motivations. In explaining the impact of aquatic exercises on the EI of veterans in Ilam City, it can be stated that engaging in sports activities, due to their dynamic nature and the reciprocal interaction with the environment and peers, enhances individual morale, fosters a positive self-image, and boosts self-confidence, ultimately improving EI [36].

Rehabilitation based on physical activities influences the enhancement and development of EI through mechanisms, such as communication, modeling, reinforcing feedback, social and communication skills, motivation preparation, emotional growth, and increased adaptability and self-esteem. Additionally, veterans participating in aquatic sports have greater interaction and engagement with others. Since EI is flexible and can be acquired, it increases with factors, such as the extent of social interaction and empathy with others. Various studies have shown that

physical activities, in addition to developing psychological skills, also improve psychological disorders and mood states [26]. Therefore, it is likely that the increase in EI is related to the improvement of these aspects; that is, as physical activities enhance mood characteristics, EI also increases as a result.

It should also be mentioned that veterans and individuals with disabilities often participate less in physical activities due to their limited motor skills, typically preferring isolation and seclusion over engaging in sports. Over time, this issue affects their levels of anxiety and depression, potentially leading to psychological disorders in the future. Aquatic exercise interventions, due to their advantages over some other training interventions, are the best way to prevent such damage. Aquatic exercises, being fun and engaging, prevent depression and seclusion, and their impact on the brain encourages individuals to participate more in group activities and training. These exercises increase physical fitness and other performance parameters [39]. This finding was confirmed in the present study as well. Sports exercises are effective in two direct ways on an individual's mood such as EI. One of them is the release of endorphins (creators pleasant feelings) and the other is the reduction of cortisol levels (a hormone released in response to stress). Endorphins are natural pain reducers, and sports exercises that have an enhancing effect on endorphin levels lead to the experience of pleasant emotions in individuals [40]. Sport exercises stimulate the production of proteins in the body that fight diseases and are referred to as antibodies. Therefore, individuals who are physically and mentally active are better equipped to combat physical illnesses and mental disorders, leading to increased happiness and improved interactions. According to researchers, one of the most effective forms of exercise for addressing mental disorders is aquatic exercise. Water exercises can serve as a strong stimulus for the hypothalamic, pituitary, adrenal, and noradrenergic systems, reducing stress and depression by decreasing cortisol levels and increasing BDNF (Brain-Derived Neurotrophic Factor) [40]. Thus, it can be said that aquatic exercises, due to the changes they induce in physiological functioning, brain cells, chemical processes, and the immune system, can have a greater and faster impact on cognitive, mental, and emotional processes, such as improving communication, enhancing positive mood, and increasing EI [39].

The inferential results of this study showed that aquatic exercises had a significant impact on the QoL of veterans in Ilam City. This finding is consistent with the results of Rezaei & Esmaili [17], Ahmadi *et al.* [41], Niazi *et al.* [16], Raue *et al.* [42], and Tanhamira *et al.* [8], but inconsistent with the results of studies by Khousravizadeh *et al.* [43] and Hassani *et al.* [44]. The reasons for these inconsistencies may include

differences in the type and level of training programs, demographic parameters, nutrition and diet, and training motivations. It should be noted that QoL is a dynamic concept; values, needs, and individual and social attitudes may change over time in response to events and life experiences. Each dimension of QoL (including physical functioning, role limitations due to problems, vitality, mental health, social functioning, bodily pain, general health, marital status, and life satisfaction) can significantly affect other dimensions. Therefore, improving the QoL of veterans depends on enhancing their health levels, with physical activity and exercise reported as the most important factors [16, 17]. Ahmadi *et al.* [45] stated that there is a significant relationship between sports activities and QoL, and this relationship is due to the positive impact of participation in sports on fitness-related factors, such as strength, cardiovascular and muscular endurance, flexibility, agility, balance, and speed, which lead to an improved QoL. One of the significant disorders associated with aging (in the elderly) and periods of inactivity (in veterans) is muscle atrophy and diseases related to muscle deterioration. Studies have shown an increase in the mRNA levels of the myostatin protein in the elderly and disabled compared to young individuals [42]. Myostatin and follistatin are important regulators of muscle volume. Myostatin, a member of the transforming growth factor-beta (TGF- β) family, is a negative regulator of skeletal muscle volume [46]. Studies indicate that with aging and periods of inactivity, increased myostatin levels reduce muscle volume by decreasing the proliferation and differentiation of satellite cells, leading to muscle atrophy [47]. Follistatin, another factor related to muscle mass, binds to myostatin and prevents it from binding to the activin receptor 2, thereby neutralizing myostatin's muscle-wasting effect [48]. Numerous studies on the impact of physical activity on these inhibitory and growth muscle factors have shown that the gene expression of follistatin in skeletal muscles increases through acute resistance and stretching exercises, as well as after endurance training [49]. Thus, maintaining muscle mass in veterans and the elderly can help them perform daily tasks better and independently, enhancing their QoL. Additionally, a review of past studies highlights the positive role of various physical activity patterns in reducing lipid profiles, such as triglycerides (TG), total cholesterol (TC), and low-density lipoprotein (LDL), while increasing high-density lipoprotein (HDL) and reducing insulin resistance (IR) [50]. Furthermore, the role of regular light to moderate physical activity in reducing cardiovascular diseases and preventing type 2 diabetes and metabolic syndrome has been established [51]. For instance, a 5% reduction in body weight through exercise and dietary adjustments can prevent type 2 diabetes by 40% to 60% [52]. Moreover, studies have shown that endurance training can significantly reduce or

control metabolic risk factors for cardiovascular diseases [53]. Considering all these factors, veterans can experience a better QoL through regular exercise. This helps them avoid difficulties in activities, such as standing, walking, lifting objects, or performing household chores, and it allows them to feel satisfied with not needing help for daily activities. Additionally, physical activity increases individuals' physical abilities, leading to improved mental and emotional well-being [54].

Overall, it can be stated that, according to ecological theory, three factors (individual, task, and environment) play a role in shaping individuals' motor behaviors. In this study, since it was not possible to change the personal characteristics of the participants to engage in physical activities, the researchers modified the task conditions (performing physical activities in water) to create favorable physical and mental conditions for the veterans, enabling them to benefit from these activities. By adapting the task conditions and considering the veterans' physical capabilities, a situation was created where they could easily engage in physical activities without fear of injury. Engaging in physical activities results in increased physical health, physical strength, mental health, a sense of competence, efficacy, responsibility, happiness, social acceptance, and social interactions for the veterans, each of which can directly or indirectly enhance EI and improve the QoL for the veterans. According to the obtained results, aquatic exercises can be utilized to improve EI and QoL, reduce negative emotions, and enhance the mental well-being of veterans. Additionally, the enjoyable nature of the aquatic environment, compared to other settings, increases the likelihood of individuals, especially veterans, engaging in sports in this environment.

Since this research was limited to the veterans of Ilam city, caution should be exercised in generalizing the results to groups and veterans from other cities. Additionally, other limitations of this research include the lack of strict control over drug consumption, difficult access to the veterans' community, varying mental and emotional states, and environmental factors. It is suggested that veterans engage in water-based exercises under the supervision of experts and sports coaches to help reduce their emotional distress. Furthermore, it is recommended to investigate the durability of the effects of water exercise on psychological parameters.

Conclusion

Aquatic exercises have a positive and significant impact on EI and QoL in the veteran population of Ilam City.

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