

Research Article

The effect of correction exercises with hydrotherapy on reduce pain, fatigue and quality of life in middle-aged women with chronic low back pain

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Abstract

Background: Chronic back pain is a common problem in the world, which is the most frequent among middle-aged women. The present study was conducted with the aim of investigating the effect of eight weeks of corrective exercises along with water therapy on reducing pain, fatigue, life expectancy and trunk kinematic indices in women with chronic low back pain.

Material and Methods: The research sample includes 30 of these people who were randomly selected and then randomly divided into two groups of 15 people, control and experimental. In this study, the amount of back pain was evaluated with the help of a visual pain assessment questionnaire. Also, the quality of life of the subjects was evaluated with the help of the World Health Organization quality of life questionnaire - short form and the intensity of fatigue with the help of the MFIS questionnaire. After evaluating the variables, the subjects were divided into two control and training groups, and the training group did the training program for 8 weeks and 3 sessions per week. The control group also did their daily activities during this period. In this study, the normality of the distributions was investigated using the Shapiro-Wilk test. In order to test the research hypotheses under normal conditions, analysis of covariance (between groups) and correlation t (within groups) were used.


Results: The results of this study showed that applying an eight-week corrective exercise program along with water therapy is effective in reducing fatigue and quality of life in addition to reducing pain ($P < 0.05$).

Conclusion: The results of this study showed the effect of corrective exercises along with water therapy on reducing back pain, improving quality of life and trunk kinematics in middle-aged women. Based on this, it seems that applying the exercises of the present study can be effective in improving the quality of life in middle-aged women with back pain

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1. Introduction

People with chronic diseases not only suffer from physical complications, but also suffer from psychological complications. This will have a direct impact on their quality of life. One of the chronic diseases is back pain. This disease is one of the most common complaints caused by musculoskeletal disorders, which almost 80% of people have experienced at least once in their lifetime. After upper respiratory infections, back pain is the second reason for visiting a doctor and the first reason for disability in people under 45 years of age and the third reason for surgery. (1) There are different causes of back pain, the most important of which are: Increasing age, smoking, chronic stress, injury, nutritional disorders, genetics, weight gain, lifting heavy weights in the wrong way, reducing flexibility, reducing disc fluid and inappropriate physical conditions. (2) Currently, there is widespread trust in self-reported questionnaires to evaluate patients with back pain. However, it has been suggested that objective measures of low back pain functional status should be used to aid clinical assessment. (3) It seems that the majority of back pains are caused by lifting heavy objects and as a result joint injuries with soft tissue disorders. Also, other factors such as repeated blows, wrong body positions and non-mechanical factors such as metabolic diseases, pathological, infectious and neurological lesions have been mentioned. 97% of back pains are mechanical, 1% are non-mechanical, and 2% are due to visceral diseases, among which disc herniation is 4% of mechanical back pains (4) Due to the extremely high mobility of the lumbar region, which is located in the vicinity of the relatively motionless region of the sacrum, this region is exposed to mechanical pressures that can lead to damage to the intervertebral disc of the lower back and most hernias

The discs in the lumbar region also occur in the discs between the fourth and fifth lumbar vertebrae and the fifth lumbar vertebra and the first sacrum vertebra. (4)

In controlling back pain, it is important to design appropriate training programs to strengthen the central stabilizing muscles and improve the performance of the mentioned system. Despite many studies in the field of back pain, there is no consensus on the most appropriate treatment intervention and research is ongoing. On the other hand, many patients, due to economic reasons, want a faster return of functional abilities, pain reduction and muscle function increase, therefore, many researchers are in front of new scientific methods that come to different results. Among these methods, water therapy can be mentioned. One of the advantages of water treatment is reducing the forces related to weight bearing. Patients who exercise in water feel lighter and move more easily, and due to floating, they feel less load on their joints. (5) In this context, Bakr et al. (2003) believe that exercises in which body weight is not tolerated are a good option for reducing back pain and a person can control his weight if he put in water Also, due to the buoyancy of water, the range of movement is wider and easier for a person, because less force is applied to the body and body joints in water. Water supports the body and reduces joint pressure and provides support and resistance for movement and develops the possibility of movement and power of action

Therefore, due to having characteristics such as hydrostatic pressure, buoyancy, adhesion, as well as the possibility of increasing sensory feedback and depth perception, the water environment can be a suitable environment for performing physical exercises in order to strengthen muscle strength. Therefore, swimming, lying down and doing exercises on water and water therapy in general is one of the best treatments for chronic back pain. (6) On the other hand, quality of life is a broad term that includes different concepts such as physical condition, social cohesion, mental state and health perception, which are based on medical evaluations, such as health, patient performance, treatment effect and finally It describes the quality and efficiency of treatment and patient care. (7) Health related to the quality of life is not only influenced by the disease and its treatment, but it is also influenced by characteristics such as the ability to cope with problems, living conditions and socioeconomic status of the individual. In recent years, the quality of life has become one of the most important subjects of clinical research, which is used to identify the differences between patients, predict the consequences of the disease, and determine how effective the therapeutic interventions have been in improving the condition of the patients. , is used. In a research, Gupta et al. (2016) compared the effects of Mackenzie and Williams exercises on dry land, and concluded that Mackenzie exercises were more effective (8) Also, in the study of Adlet et al. (2021), about 80% of people did not perform the movement correctly in difficult movements (rotational movements of the waist), but they had less problems in performing easier movements such as flexion, extension, flexion to the sides.

The possible reason is that in performing these movements during 6-8 weeks, due to a wrong movement, the person will unintentionally cause a new disorder in his body, because the coach or sports medicine specialist performs the exercises of the supervised persons. And he did not respond to correct wrong movements. (7) Hence, in the present study, the effect of long-term corrective exercises along with water therapy on reducing pain and fatigue and life expectancy of middle-aged women with chronic back pain was investigated, and the main question of the research was raised as follows: Are corrective exercises along with water therapy effective in reducing pain and fatigue and life expectancy of middle-aged women with chronic back pain?

2. Materials and Methods

The current research is a semi-experimental type with a control group as well as a pre-post-test design, which was approved by the ethics committee of the Islamic Azad University - Tehran East Branch with the code number (IR.IAUET.REC.1401.208).

The research sample also includes 30 women (35-45 years old) who were randomly selected by JPower software by referring to specialist doctors' offices in areas 1, 2, and 3 of Tehran, and then randomly divided into two groups. 15 people were control and experimental.

Inclusion criteria:

To be included in this study, people must be female in the age range of 35-45 years old, report a score between 4-5 on the VAS pain index, have no history of back and lower limb surgery, and have a history of pain in the spine. The vertebrae were at least six months old. Exclusion criteria: non-attendance at exercises (three sessions), non-cooperation of the subject, report of pain due to exercise movements, history of rheumatoid arthritis, history of fracture, surgery and dislocation of the spine, congenital abnormalities in the spine, pregnancy and also before. From the beginning of the exercises, explanations were given to the subjects regarding how to do the work and the routine.

Fatigue severity assessment

In order to check the intensity of fatigue, MFIS fatigue questionnaire was used. This questionnaire consists of 21 questions and each question has 5 options ranging from 0 to 4 points, which is finally obtained from the sum of the points of the questions, which is from 0 to 84. A score of 84 indicates the highest level of fatigue and a score of 0 indicates no fatigue.

Pain assessment

The visual pain intensity measurement scale (VAS) was used. This scale is in the form of a horizontal bar with a length of 100 mm or 10 cm, one end of which is zero and the other end is 10, which means the most severe pain possible. This scale is one of the most reliable visual grading systems for pain.

Assessment of life- quality

To evaluate the quality of life, the World Health Organization Quality of Life Questionnaire - Short Form (WHOQOL-BREF) was used.

Corrective exercise program along with hydrotherapy protocol

The section of corrective exercises is taken from NASM exercises and the study of Kiel et al. (2021), in which subjects perform 12 feedback corrective exercises during 8 weeks, 3 sessions per week and each session lasts 15 minutes. These exercises include: Cobra exercise, DNS child position (lying on the back and holding the toes with the hand), pulling one or both knees to the chest, raising the leg directly while lying on the back, stretching the hamstrings, four position Legs, stretching of the pyramidal muscle, stretching in the sitting position, plank from the stomach, contraction of the stomach while lying on the back and sitting on the Swissball ball with closed eyes. (9)

Figure 1. Perform NASM corrective exercises





The exercise program based on the instructions for corrective exercises included the following three parts:

1. Warming up: This part of the exercise included 5 to 10 minutes of the whole exercise, which mostly included walking in the shallow part of the pool.
2. The main exercise program for people with back pain: this part of the exercise included 15 to 20 minutes of exercise time, which includes various stretching and PNF movements in the flexor and extensor muscles of the knee, thigh and trunk, moving the legs in the position Sitting, maintaining pelvic tilt while standing, bringing the knee toward the chest, flexing the trunk with an elastic band, adducting the pelvis, tilting the pelvis, stretching the back muscles, stretching the gluteus-maximus muscle, and stretching the hamstrings were included

All the stretching movements were performed in accordance with the principle of overload from 10 to 30 seconds. The speed of movement in the high sets also increased the intensity, and this means the principle of overload. Cooling down: At the end of each training session, about 5 minutes were dedicated to cooling down, which was more similar to the warm-up movements but with a lower intensity. After the initial examinations and tests and the formation of the hydrotherapy experimental group, they participated in a training program for 8 weeks and 3 sessions per week (the duration of each session is about 45 minutes) in the swimming pool the ACSM sports prescription guidelines, the training program consisted of 3 parts: warm-up, main training program and cool-down.

The selection of exercises and how to perform them was from simple to difficult, in this way that the initial sessions of the movements were easier and had less intensity, number of repetitions and time, and the subjects performed the movements with more rest time and with the passage of time and the direction of compliance The principle of overload and considering that the abilities of the subjects increased, the training program was carried out by increasing the training time, intensity and number of repetitions. Applying surface or deep heat to the soft tissues prior to the pool session helped to increase the elasticity of the shortened tissues. (10)

Data Analysis Method

In this research, descriptive and inferential statistics were used to analyze the data. In descriptive statistics, mean and standard deviation for data description, graphs for comparison between groups, and in inferential statistics after examining the normality of distributions using the Shapiro-Wilk test, analysis of covariance (between groups) and correlated t within group) was used.

Findings

Table 1. Demographic characteristics of subjects

Variables	control group (15 people)	Corrective exercise with Hydrotherapy (15 people)	P
age (years)	39.20± 3.2	40.66 ± 3,3	0.24
height(meters)	1.67± .022	1.68± .010	0.26
weight (kg)	68.26 ± 3.13	77,72 ± 3.17	0.13
BMI (kg.m2)	21.59 ± 0.85	22.02 ± 0.01	0. 21

The results of the above table showed that the statistical population is homogeneous and there was no difference between the training and control groups. Shapiro-Willick test was used to determine the normality of the data. The results of the test showed the normality of the data, for this purpose, normality tests were used to compare between groups and within groups. Correlated t-test was used for intra-group comparison and covariance test was used for inter-group comparison.

Table 2. Correlated t-test results in research variables

Variables	T	Pre-test (mean \pm standard deviation)	Post-test (mean \pm standard deviation)	P
The amount of pain	control group	4.46 ± 0.74	4.06 ± 0.59	0.08
	Correctional hydrotherapy	4.53 ± 0.74	2.76 ± 0.72	.001*
Fatigue rate	control group	4.32 ± 1.42	4.29 ± 0.37	0.15
	Correctional hydrotherapy	3.58 ± 0.31	3.00 ± 1.78	.001*
Physical health	control group	36.71 ± 7.22	39.90 ± 8.08	0/08
	Correctional hydrotherapy	37.33 ± 7.94	77.09 ± 10.04	.001*
mental health	control group	37.00 ± 10.10	38.83 ± 9.14	0.21
	Correctional hydrotherapy	38.22 ± 12.03	70.07 ± 13.31	.001*
Community Relations	control group	41.44 ± 11.88	51.22 ± 10.88	.001*
	Correctional hydrotherapy	40.76 ± 14.02	54.11 ± 10.93	.001*
environmental health	control group	47.20 ± 9.30	40.37 ± 8.36	0.79
	Correctional hydrotherapy	40.72 ± 10.08	47.04 ± 7.64	0.07
Total scores	control group	27.03 ± 14.92	30.10 ± 13.70	.009*
	Correctional hydrotherapy	28.93 ± 12.49	50.40 ± 26.83	.001*

* There is a significant difference

The results of the correlated t-test showed that corrective exercises and water therapy after eight weeks had an effect on the amount of pain and intensity of fatigue and quality of life.

Table 3. The results of the covariance test in the research variables

Variables	Adjusted mean		Mean square	DF	F	P	Eta
The amount of pain	control	Correctional hydrotherapy	١٤.٩٥	١	٣٤.٨٠	.٠٠١*	.٠٥٦
	٢.٦٦	٤.٠٧					
Fatigue rate	control	Correctional hydrotherapy	6.3٠	١	4.90	0.01*	0.18
	5.31	7.28					
Physical health	control	Correctional hydrotherapy	٥٦٢٤.٤٢	١	٨٧.١١	.٠٠١*	.٠٧٦
	٦٧.٢٢	٣٨.٨٢					
mental health	control	Correctional hydrotherapy	٣٢٢٠.١٦	١	٢٤.٦٧	.٠٠١*	.٠٤٧
	12.76	19.20					
Community Relations	control	Correctional hydrotherapy	١.٧٣	١	.٠٠١	.٠٠١*	.٠٠١٣
	53.19	41.20					
environmental health	control	Correctional hydrotherapy	١٦.٦٧	١	٠/٠.٤٩	.٠.٤٨	.٠.٤٩
	71.49	70.11					
Total scores	control	Correctional hydrotherapy	٤٢٢٥.٦٦	١	١٨.٠١	.٠٠١*	.٠.٤٠
	73.82	12.45					

* There is a significant difference

4. Discussion

The results of research on pain showed the effect of exercise program on reducing pain. The results obtained are consistent with the research of Christako et al. (2020) who pointed out the effect of water exercise on reducing back pain, Gramatikova and colleagues (2020) who pointed out the effect of water exercise on reducing back pain. (11, 12)

Hydrotherapy is an intervention method that includes the use of activities to promote physical and cognitive rehabilitation. Water intervention is usually done in pools of different sizes where participants have enough space to stand and do exercises (13).

Water may increase blood flow, which is thought to help flush out allogeneic chemicals and facilitate muscle relaxation. In addition, the hydrostatic effect may relieve pain by reducing peripheral edema and reducing sympathetic nervous system activity, which is one of the possible reasons for pain reduction in this study. (14)

In the context of the effect of the exercise program on pain, it should be stated that water can lead to pain modulation, because the pain threshold increases with the increase in temperature in warm or semi-warm water, possibly for sensory overload and stimulation of thermal receptors, which is shown in many studies. On the other hand, exercising on land can also be a factor in reducing pain. Many studies have confirmed that lower abdominal muscle weakness is the cause of back pain. Therefore, increasing muscle strength may be effective in reducing pain, which has been shown in many studies. (15, 16)

In the context of reducing pain and disability in the studies stated, hydrotherapy provides a favorable environment for aerobic exercise with more intensity than possible on land due to the reduction of joint loading that has been shown in many studies. (17) In addition, in the field of exercises on land, which was included in this program, it has been stated that exercise greatly reduces pain and disability.

Improved flexibility following an exercise program in water can be a possible factor in pain reduction following the implementation of a maintenance program. In this regard, it was stated that exercising in water increases flexibility and muscle strength, because the muscles of the trunk and back are more active during exercise in water to maintain the correct position of the body, and as a result, the range of motion increases further, which reduces Most of the pain also follows. (18) Also, hydrotherapy reduces the level of back pain and disability, because the buoyancy of the water can eliminate the gravitational forces to counteract the body weight, which reduces the amount of stress on the joints to perform exercises with less effort and feel less pain. It can also provide the greater range of motion needed to lift the heaviest limbs or legs during exercise. (19) These findings are in accordance with previous studies with various water-based sports intervention programs that can improve pain caused by tension and musculoskeletal disability in people with back pain. The present study shows the effectiveness of water exercises in addition to sports in It is dry

On the other hand, applying feedback during exercises can also be an effective factor in reducing pain after exercise. (20, 21) based on the results of the exercise program of the present study, it is recommended for people with back pain. The results of the present study generally show the effect of 8-week exercise program on improving the quality of life in back pain patients. The result of the present study on the effect of exercise on the quality of life of back pain patients with the results of studies by Christako and colleagues (2020) who pointed out the effect of water therapy on improving the quality of life, Bekiari (2021) who pointed to the effect of exercise in water on the amount of pain and quality of life of people MS sufferer pointed out, Mirmoazhi et al. (1400) who pointed out the effect of exercise in water on improving the quality of life is consistent. (22 , 21)

The high prevalence of back pain and the resulting inability to perform daily tasks and disruption in social activities will have a very negative effect on the patient and the society. The high prevalence of back pain and the resulting inability to perform daily tasks and disruption in social activities will have a very negative effect on the patient and the society. Meanwhile, chronic back pain is very important. In some cases, the patient even becomes disabled and the recurrence of symptoms after temporary recovery is also one of the problems of some patients with back pain, so that sometimes the patient has periods of relapse and remission for a long time. He experiences such pain. Quality of life is an important part of general health and well-being. It is a dynamic and multidimensional concept that includes physical, psychological and social aspects of life and has different interpretations of philosophical, political and health aspects.

Most people who suffer from back pain During their lifetime, they face major physical and mental problems, such as reduced physical, mental and social functions, reduced general health, and constant or periodic pains, and this situation leads to a decrease in their quality of life. (23)

Exercises on land and water focus on improving core muscle control, improving balance, proper posture, spinal stability, and the correct way to perform daily movements. Exercise programs in the water slowly and without any pain make the spine flexible because the movements are based on the body's physiology. On earth too, gravity does not press on the back. It protects the back and strengthens its muscles. Arm movements (raising the hands) stretches the body, strengthens the back and arms. (24,25,26) Exercises focusing on the back and lower body muscles improves neuromuscular coordination and its implementation in the correct biomechanics of the body prevents any damage to the joint and muscle structure of the body. Based on this, improving the quality of movement and reducing pain after exercising can be a factor in improving the quality of life in

Conclusion

The results of this study show the effect of corrective exercises along with hydrotherapy exercises on reducing back pain, reducing fatigue and improving the quality of life in women. Based on this, it seems that applying the exercises of the present study can be effective in improving movement performance in women with back pain and increasing their quality of life.

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Compliance with ethical standards

Conflict of interest None declared.

Ethical approval the research was conducted with regard to the ethical principles.

Informed consent Informed consent was obtained from all participants.

Author contributions

Conceptualization: F.SH., A.R.D., S.K.M.S.;
Methodology: F.SH., A.R.D., S.K.M.S.; Software: F.SH., A.R.D., S.K.M.S.; Validation: F.SH., A.R.D., S.K.M.S.; Formal analysis: F.SH., A.R.D., S.K.M.S.; Investigation: F.SH., A.R.D., S.K.M.S.; Resources: F.SH., A.R.D., S.K.M.S.; Data curation: F.SH., A.R.D., S.K.M.S.; Writing - original draft: F.SH., A.R.D., S.K.M.S.; Writing - review & editing: F.SH., A.R.D., S.K.M.S.; Visualization: F.SH., A.R.D., S.K.M.S.; Supervision: F.SH., A.R.D., S.K.M.S.; Project administration: F.SH., A.R.D., S.K.M.S.; Funding acquisition: F.SH., A.R.D., S.K.M.S.;

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