

Research Article

The Effect of Hydrotherapy in the Treatment of Patients with Lumbar Disc Herniation Referred to the Orthopedic Clinic

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Abstract

Introduction: One of the major benefits of hydrotherapy in patients with low back pain is the reduction of weight-bearing forces, and it seems it causes the feeling of weight loss in muscle cramps to be significantly reduced, which reduces the muscle spasm caused by disc herniation. **Method:** The present study is an experimental research and a clinical trial case-control. Among all patients with lumbar disc herniation in orthopedic clinic of Imam Khomeini Hospital in Ahvaz in 2018, 96 patients with the approval of an orthopedic specialist were considered to enter the study. After completing the consent form, patients were divided to two groups of hydrotherapy and medication (case) and medication (control), randomly. **Findings:** The total of 96 patients was studied; of which 73.9% were female and 26.1% were male. Low back pain in the case and control groups was compared at a pre-post study. At the beginning of treatment, the mean rate of pain in these two groups was 6.77 ± 1.03 and 0.94 ± 6.95 , respectively, and at the end of treatment the mean was 4.68 ± 0.64 and 4.77 ± 0.85 , respectively. Comparing the rate of lower limb pain in the intervention and control groups, at the pretreatment stage, the rate of pain was 6.25 ± 0.66 and 5.75 ± 0.69 respectively and at the post-treatment stage, rate of pain was 3.85 ± 0.58 and 3.85 ± 0.35 . Comparing the quality of life at the pre and post study in the intervention and control groups, the rate of pain at the beginning of treatment were 29.63 ± 4.63 and 4.27 ± 29.67 respectively, and at the end of treatment was 14.73 ± 3.53 and 18.97 ± 3.13 , respectively. **Conclusion:** Analyzing the above findings shows that hydrotherapy generally increases the life expectancy and vitality of patients due to their feeling of greater relaxation.

Keywords: Back pain; Disc herniation; Hydrotherapy

Introduction

Low back pain, which is a major problem in public health with a prevalence of 12%-15%, causes pain and anxiety to patients [1]. In adolescence, about 20% of people show mild symptoms of disc degeneration which gradually get increased with age, especially in men. So, 60% of people in their 70s suffer from severe disc degeneration [2]. Disc degeneration is asymptomatic in many cases, but is mainly associated with radicular pain in the

lower extremities or weakness of the limbs and bladder sphincter disorders due to compression of the spinal cord [3,4]. Numerous factors have been suggested as causes of disc herniation, including weight gain, intense and frequent physical activity, chronic spinal stress, trauma, aging, smoking, nutritional deficiencies, genetic factors, and anatomical abnormalities [5,6]. In recent years, several studies have reported a strong familial genetic predisposition to discopathy [7,8]. Even the effect of genetics on the development of discopathy has been estimated about 60% [8]. Low back pain is the most common symptom of patients with lumbar disc herniation.

Other symptoms include radicular pain, sensory and motor deficits, reflex abnormalities, sphincter defects, urinary and fecal disorders, and sexual dysfunction [1,9]. The most common disk space involvement is the space between the S1-L5 seals. Most pain occurs in a lower limb. Nerve root stimulation can cause pain in a distribution in the medulla, paresthesia and anesthesia in the nerve pathway involved [10]. Medical history and careful examination are the first step in clinical suspicion of diseases caused by lumbar discopathy. Examination of the sensation and movement of the legs and determination of distal and proximal muscular strength of the lower extremities, as well as examination of deep tendon reflexes and sphincters tone are the basic principles of determining the severity of the lesion and its prognosis [11,12].

Nowadays, MRI is the choice modality in the accurate diagnosis of this lesion [13]. Simple x-ray, and in case of necessity CT scan are used to prove diagnosis fractures or associated vertebral instabilities and to determine the treatment methods [14]. 90% of acute sciatica attacks are treated with supportive care [15,16]. In the treatment of symptomatic lumbar discopathy, in addition to rest, weight loss, smoking cessation, NSAIDs, physiotherapy, dynamic exercise and hydrotherapy complement the principles of treatment [17-19]. One of the major benefits of hydrotherapy is the reduction of forces related to weight bearing. Patients who get workout with water-walking feel lighter and easier in movement, and feel less strain on their joints due to floating. It seems that the feeling of weight loss in water, and the massage-therapy property of water, eliminates or significantly reduces muscle dehydration, and causes reduction of the muscle spasm occurred by disc herniation [20-22]. Therefore, according to the physical properties of water, including relieving pressure on the spine, relieving spasms, controlling gravity, strengthening muscles, etc., the researchers investigated the effect of hydrotherapy in the treatment of patients with lumbar disc herniation who referred to the orthopedic clinic of Imam Khomeini hospital of Ahvaz.

Materials and Methods

The present study is a case-control, clinical trial study. Among all patients with lumbar disc herniation in orthopedic clinic of Imam Khomeini Hospital in Ahvaz in 2018, 96 patients with the approval of an orthopedic specialist were considered to enter this study. After completing the consent form, patients are divided to two groups of hydrotherapy and medication (case) and medication (control), randomly. Patients were randomly selected in terms of age and gender and are visited and evaluated at the beginning of the visit and after 3 and 6 months of treatment. Data were collected by using questionnaires.

Inclusion Criteria:

- patients with low back pain,

- MRI showed evidence of mild to moderate disc bulging
- the patients with no indication for disc herniation surgery.

Exclusion Criteria:

- any spinal problems, recent surgery, any musculoskeletal problems,
- any unknown or unexamined pathology,
- combination of arthritis and rheumatoid arthritis.

The questionnaires include demographic information, visual pain scale questionnaire and the Oswestry low back pain disability questionnaire and quality of life questionnaire. The analysis will be performed using SPSS statistical software version 22. Data are analyzed by descriptive statistics (mean and percentage) and analytical statistics (independent t-test) or its non-parametric equivalent. Also, figures and tables appropriate to the data will be used. Significance level will be less than 0.05.

Findings

A total of 96 patients referred to the orthopedic clinic of Imam Khomeini Hospital who had the inclusion criteria, writing, and signing consent forms, participated in the study. Patients were randomly divided into two groups: hydrotherapy and drug therapy (case) and drug therapy group (control). Figure 1 summarizes the steps of the study.

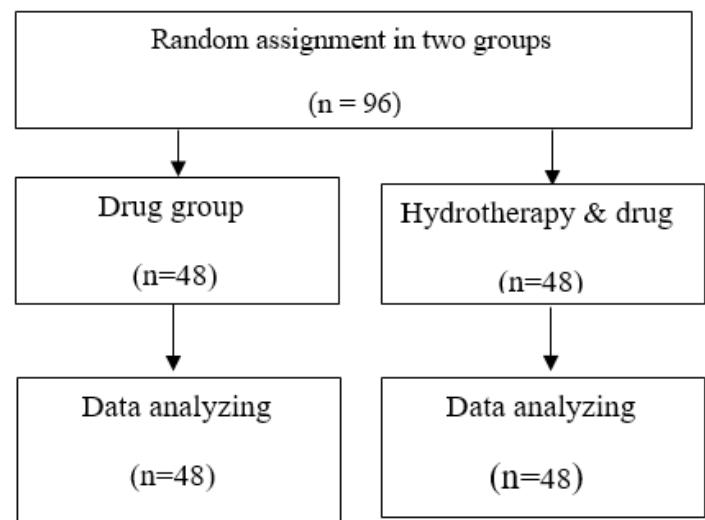


Figure 1: Steps and random allocation of patients participating in the study.

As it is seen in figure 1, the participants of drug group and hydrotherapy & drug group are 48 individuals in each group. And they are totally included in the analysis.

According to Table 1, the comparison of the mean age in the two groups was performed by independent t-test which showed a significant difference ($P = 0.001$); the case group was approximately 5 years older than control group. Comparing gender of the participants; the ratio is approximately similar. Chi Square test analysis did not show significant difference ($P = 0.8$). Comparison of levels of education in the case and control groups indicates the statistics of levels of education. Chi Square test analysis did not show significant difference ($P = 0.3$). Comparison of smoking history in case and control groups indicates smoking history in case and control groups. In this table, Chi-square test showed the same effect of smoking in both group ($p = 1$). Comparison of treatment history in case and control groups indicates treatment history in case and control groups. Previous treatment done in the case group was more than twice of the control group which showed to be a significant difference ($P = 0.001$). Comparison of past medical history in the case and control groups depicts comparison of past medical history in the case and control groups. Chi Square test analysis did not show significant difference ($P = 0.8$). In Table 2, the rates of low back pain in the case and control groups were compared; of course, the comparison is presented at the beginning and at the end of the study.

Variables		Case Mean \pm SD	Control Mean \pm SD	P-value
Age (year)		51 \pm 8	46 \pm 7	0.001
Gender	Male	13(27.1) %	12(25) %	0.8
	Female	35(72.9) %	36(75) %	
Education Levels	Diploma	24(50) %	23(47.9) %	0.3
	Bachelor	22(45.8) %	19(39.6) %	
	Master	2(4.2) %	6(12.5) %	
smoking history	positive	10(20.8) %	10(20.8) %	1
	negative	38(79.2) %	38(79.2) %	
treatment history	positive	36(75) %	16(33.3) %	0.001
	Negative	12(25) %	32(66.7) %	
past medical history	positive	26 (54.2) %	27 (56.3) %	0.8
	Negative	22 (45.8) %	21 (43.8) %	

Table 1: Comparison of demographic info. in the case and control groups.

variables		Case N (%)	Control N (%)	P-value
low back pain	beginning	6.77 \pm 1.03	6.95 \pm 0.94	0.3
	end	4.68 \pm 0.64	4.77 \pm 0.85	0.001
	Changes	-2.77 \pm 0.85	-2.18 \pm 1.1	0.007
	P-value	0.001	0.001	

Table 2: Comparison of the rates of low back pain in the case and control groups.

According to above Table 2, the average scale of low back pain was not significant before the study in the two groups ($P = 0.3$). But after the intervention, the difference was significant ($P = 0.001$). The comparison of mean pain rate in both groups also shows the significance ($P = 0.007$). Intra-group comparisons in both groups also indicate a significant decrease in pain compared to the beginning of the study ($p = 0.001$). Due to the considerable differences in ages and the history of treatment in the two groups, the repeated-measures test was applied for elimination of the effects of these two variables which shows the effectiveness of hydrotherapy in reducing low back pain significantly compared to the control group ($P = 0.04$).

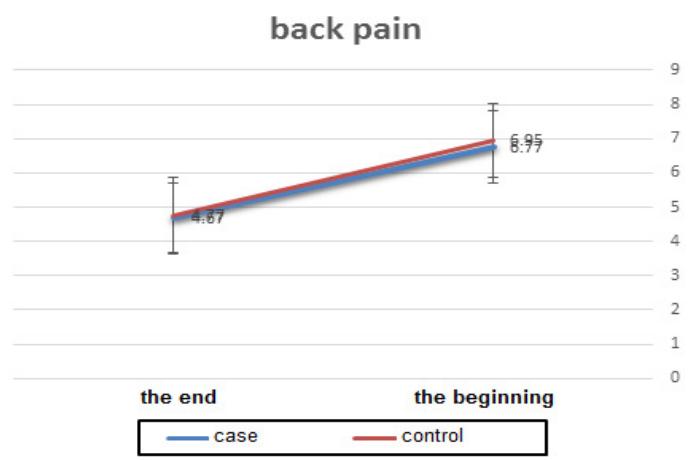


Figure 2: Comparison of low back pain scores at the beginning and end of the study between the case and control groups.

Based on Figure 2 the rates of lower limb pain in the two groups were compared at the beginning and the end of the study by t-test. There is steady decrease in the lines of both groups indicating lower back pain at the end of the study in both groups.

variable		Case Mean \pm SD	Control Mean \pm SD	P-value
lower extremity pain	beginning	6.25 ± 0.66	5.75 ± 0.69	0.001
	end	3.85 ± 0.58	3.85 ± 0.35	0.01
	Changes	-2.39	-1.89	0.008
	P-value	0.001	0.001	

Table 3: Comparison of lower extremity pain scores in the case and control groups at the beginning and end of the study.

Based on Table 3, there was a significant difference between the two treatment groups at the beginning of the study ($P = 0.001$). It was the post-study analysis which clarified significant difference and the reduction of pain in the hydrotherapy group compared with drug therapy group ($p = 0.008$). Intra-group comparison using paired t-test in both groups depicted a significant reduction in lower limb pain during the study period ($P = 0.001$). However, after adjusting the background variables (age and history of treatment) with Repeated-Measures test, the difference did not lose its significance ($P = 0.03$).

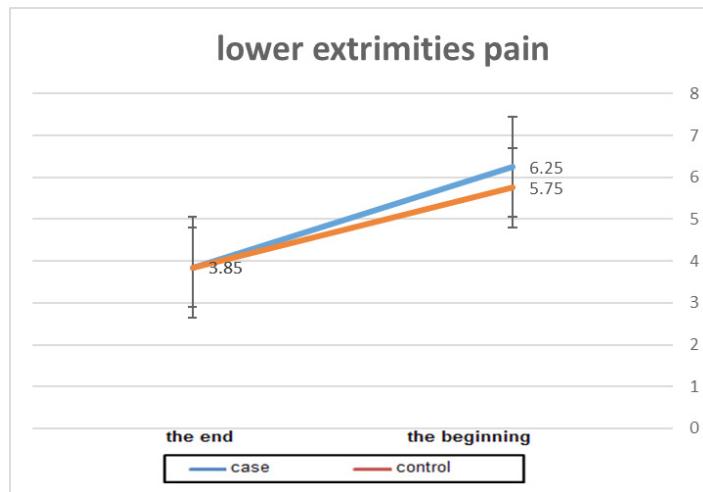


Figure 3: Comparison of lower extremity pain scores in the case and control groups at the beginning and end of the study.

Figure 3 shows a decreasing trend from the beginning to the end; the extremity pain scores decrease from 6.25 and 5.75 to 3.85. It clearly depicts lower pain.

variable		Case Mean \pm SD	Control Mean \pm SD	P-value
quality of life	beginning	29.63 \pm 4.63	29.67 \pm 4.27	0.97
	end	14.73 \pm 3.55	19.97 \pm 3.13	0.0001<
	Changes	14.9 \pm 4.2	10.7 \pm 3.7	0.0001<
	P-value	0.018	0.018	

Table 4: Comparison of quality of life level in the case and control groups at the beginning and end of the study.

According to Table 4, the level of quality of life in the two groups at the beginning and end of the study was compared using independent t-test. Based on the findings, at the beginning of the study, there was no significant difference between the two groups in terms of quality of life ($P = 0.97$). At the end of the study, the case group had significantly ($P < 0.0001$) better quality of life than the control group. Comparing the changes during the study period between the two groups, it was clear that the hydrotherapy group had better quality of life ($P < 0.0001$). In-group comparison, both groups indicated a significant increase in their quality of life during the study period ($P = 0.018$). After adjusting the background variables (age and history of treatment), a significant difference was observed between the two groups ($P = 0.001$).



Figure 4: Comparison of the quality of life at the beginning and end of the study between case and control groups

Figure 4 shows a steady increase in the quality of life throughout the time of the study; at the beginning of the study the rates of quality of life were lower.

Discussion

The aim of the present study was to investigate the effect of hydrotherapy in the treatment of patients with lumbar disc herniation referred to the orthopedic clinic of Imam Khomeini Hospital in Ahvaz during 2018-2019.

Comparing the rate of low back pain at the beginning and end of the study between the case and control groups indicated that there was no significant difference between the two treatment groups at the beginning of the study ($P = 0.3$). But after performing hydrotherapy intervention in the case group at the end of the study, there was a significant difference between the two groups in terms of reducing back pain ($P = 0.001$). However, after adjusting background variables (age and history of treatment), there is also a significant difference ($P = 0.001$). Comparison of the changes during the study period between the two groups also showed that hydrotherapy group experienced a greater reduction in low back pain ($P = 0.007$) and while entering the background moderating variables (age and history of treatment) there was also a significant difference ($P = 0.004$). Moreover, intragroup analysis reveals a significant reduction in lower extremity pain during the study period ($P = 0.001$). After adjusting the background variables (age and history of disease), these changes were statistically significant only in the hydrotherapy group ($P = 0.006$). Several studies on hydrotherapy program in patients with low back pain stated that exercise in water appears to be effective on decreasing pain and improving function in adults with chronic low-back pain [23-25].

The above findings are consistent with the results of Waller et al. that confirmed the effect of water-walking workout over improving chronic low back pain [26]. Two separate studies conducted in 2012 also expressed the effect of hydrotherapy and massage on pain and physical function in men with chronic low back pain due to lumbar disc herniation [27,28]. Lotfi et al. confirmed the effect of six weeks of supine movement on water reduces the rate of pain and functional disability in men with chronic back pain caused by lumbar disc herniation [29]. Therefore, the results obtained from the mentioned studies are consistent with the results of the present study. Comparing the rate of lower limb pain at the beginning and end of the study between the case and control groups, the results showed a significant difference between the control and case groups ($P = 0.001$). However, after adjusting the effect of the background variables (age and history of treatment), there is also significant difference ($P = 0.03$). Also, at the end of the study, there was no significant difference between the two groups in terms of lower limb pain ($P = 0.1$). During the study it was observed that the subjects in the hydrotherapy group witnessed a greater reduction in lower extremity pain ($P = 0.008$). However, after adjusting the effect of the background variables (age and history of treatment), there was not also a significant difference ($P = 0.1$). Although intragroup comparison, both groups showed a significant reduction in lower limb pain during the study period ($P = 0.001$). And after adjusting the effect of background variables, the changes (age and history of treatment) were statistically significant only in the hydrotherapy group ($P = 0.04$).

Our findings are also consistent with the results of the

study by You-sin Kim, et al. [21]. In the mentioned study, the results suggested that aquatic backward locomotion exercise is as beneficial as progressive resistance exercise for improving lumbar extension strength in patients after lumbar discectomy surgery. Despite the difference in the type and duration of training sessions (compared to this study), the similarity in results probably is the effect of physical properties of the water [21]. Khanjari et al. showed that an underwater environment allows early active mobilization, endurance and dynamic strengthening; thus, hydrotherapy can reduce pain. Their finding about the variables of pain and disability also was similar to the present study [22]. The results of the present research are in line with the results of Sedaghati, et al. They evaluated the effects of 12 weeks of water-strengthening exercises on the pain of women with chronic low back pain and concluded that that the core-muscle stabilization training of the spinal cord in water decreases the pain intensity [30]. The results of Barker's study are also similar to the results of the research, although their research evaluated the effect of aquatic exercise on low back pain and radicular pain due to intervertebral disc protrusion in women; the study also mentioned the positive effects of aquatic exercise on patients' pain [31]. Also, the results of this study were was in contrast with the findings of Lee et al. who reported that a course of hydrotherapy had no positive effect on reducing pain and disability while it reduced the favorite range of motion and the walking speed [1]. The results of comparing the level of quality of life at the beginning and end of the study between the case and control group showed that at the end of the study there was a significant difference between the two groups ($P < 0.0001$) and the patients in the hydrotherapy group had better quality of life ($P < 0.0001$). However, after adjusting the effect of the background variables (age and history of treatment), the difference did not lose its significance ($P = 0.018$).

Finally, in intragroup analysis, both groups showed a significant increase in their quality of life during the study period ($P = 0.001$). However, these changes remained statistically significant after adjusting for the effect of the underlying variables (age and treatment history). Therefore, according to the results, it can be said that hydrotherapy has been effective on the patients' quality of life. The results of the present study are consistent with the findings of other researchers. In a study, Heinman et al investigated the effect of hydrotherapy on patients with chronic low back, knee and thigh pain. After 6 weeks of hydrotherapy, pain decreased significantly and the physical function, strength, quality of life and muscle strength improved; they concluded that hydrotherapy reduced morning pain and dryness and increased motor function and other factors [2]. Also, the present study is also consistent with several similar studies that showed the effectiveness of hydrotherapy on the life function of patients with chronic low back and knee pain [1,32-36].

Conclusion

It can be declared that hydrotherapy generally increases the life expectancy and vitality of patients due to their feeling of relaxation. The mechanism of pain relief in these patients is due to the physical properties, temperature and massage properties of water. Finally, the result of all the above analysis includes the improvement and promotion in patients' quality of life, which leads to an increase in physical and mental health of patients. It is suggested that specialists compare hydrotherapy exercises with other training methods and evaluate the results. In addition, the effect of hydrotherapy exercises on other chronic diseases should be investigated. It is indeed suggested that the effect of hydrotherapy on the quality of working life be examined. The effectiveness of aquatic therapy on the patients' quality of life with knee pain can also be investigated in further researches.

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