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The Comparison of hydrotherapy and Yoga exercises in basis of chronic low back pain reduction

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ABSTRACT

Low back pain is a common and significant disease among individuals that this pain may be due to the reasons such as muscle or soft tissues sprain or strain. Low back pain can be either acute, sub acute or chronic in duration. With conservative measures, the symptoms of low back pain typically show significant improvement within a few weeks from onset, in which yoga could ease the low back pain by stretching and strengthening the muscles of the lower back. it increases blood circulation which this brings healing nutrients to the injured tissues .yoga also helps maintain a natural curvature of the spine that is crucial in avoiding back pain .there is no set of physical exercises that could be equal to yoga .present study as a case study has studied the relative effects of hydrotherapy exercises and yoga practices as a remedy for chronic low back pain.

Keywords: *hydrotherapy, pain reduction, chronic low*

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INTRODUCTION

Low back pain is a common musculoskeletal disorder affecting most of people at some point in their lives. The majority of lower back pain stems from benign musculoskeletal problems, and is referred to as *non specific low back pain*; this type may be due to muscle or soft tissues sprain or strain, particularly in instances where pain arose suddenly during physical loading of the back, with the pain lateral to the spine. The patients within chronic low back pain which their back pain was due to string and spring of the muscles, were randomly assigned to three groups as hydrotherapy exercise group, yoga practice group and control group. Similar programs such as stretching exercise, strengthening exercise and balance exercise were applied on both hydrotherapy and yoga groups during three days a week for 12 weeks. During the study period, no treatment was applied on the control group.The evaluation parameters were included of Ronald Moris disability questionnaire (RMDQ). Pressure biofeedback unit (PBU)test for strengthening the trunk flexor muscles, and Sorensen test for strengthening the trunk extensor muscles,and SLR test for flexibility of hamstring muscles .all assessment parameters were measured in the end of exercise program at baseline.Low back pain could be classified into three classifications as following: acute (less than 4 weeks),sub-acute (4-12 weeks), chronic (more than 12 weeks).Gandhi (1962) announced that the exercise and different physical activities have turn out to be corrective alternative for medicines. It is almost accepted that customary physical exercises facilitate one to be physically fit and to carry on the usual individual in his daily doings. But anybody who wishes to perform any physical activity or exercise as a remedy for an injury or any other therapeutic problem, that one has to go beyond the undemanding rule of customary exercises, and slot in intense and recurrent physical drills geared towards developing those physical qualities for accomplishment in his meticulous endeavor. Exercise, intensive multidisciplinary treatment programs, behavioral therapy, acupuncture, and sham acupuncture, massage therapy within ice or heat (French, Cameron, walker,reggars,and ester man, iyngar,and hatha yoga (small trial), muscle energy technique, correcting leg length difference, other treatment that was not reviewed are education and attitude adjustment, increse of internal hip rotation, increase of internal hip rotation with stretching or connective tissue massage ,medical cannabis.

To understand the low back pain is knowing more about spine and its function. The back is an intricate structure of bones muscles, and other tissues that form the posterior part of body's trunk, from the neck to the pelvis. The centerpiece is the spinal column, which not only supports the upper body's weight, but protects the spinal cord ,and it delicate the nervous system structure that carries signals which control the body's movements and conveys it's sensations. The vertebrae forming the spinal column, is also known as the spine. The role narcotics for chronic low back pain are uncertain. Medical reports show that %60 to %70 of people suffer from back pain at some time in their lifetime .some of them develop acute low back pain ,and it is probably up to %30 population who developed chronic low back pain .chronic low back pain is a major health problem with enormous economic and social costs. Back pain is slightly more common in women than men. A survey of the point prevalence of back pain in workers showed that approximately half of women suffered from recurrent back pain. Many conditions cause back pain,and they could be treated with conscious and gentle yoga practice and hydrotherapy exercises. They have proven to be a safe and effective way to alleviate many forms of back pain and prevent its recurring bouts. Researcher tried to find out reviews related to the same as was interested, but she came to the conclusion that no study has been conducted in this manner, and the effectiveness of these two different treatments were considered as a remedy for low back pain. Therefore, researcher has decided to find out the effect of hydrotherapy .exercises and yoga practices were considered for chronic low back pain.

Ito et al. developed a test for evaluating isometric endurance of the trunk extensor muscles. The Ito test allows a rapid, simple and reproducible evaluation of the isometric endurance of the trunk extensor muscles. It discriminates between healthy individuals and patients with low back pain, and the occurrence of low back pain may be predicted in the near future. This test has been used in many studies,andthe test was performed as following: the patient lies in the prone position with a pad under the abdomen and the arms along the sides. When a signal is given, the individual lifts the upper body while flexing the neck as much as possible, and contradicting the gluteus maximums muscles to stabilize the pelvis .the test consists in holding this position as long as possible while breathing normally .time was recorded in seconds using a stopwatch.

This study showed that we can use the hydrotherapy exercises and yoga practices respectively as a remedy for chronic low back pain, increasing the endurance of the trunk flexor and trunk extensormuscles, increasing flexibility of hamstring muscles in patients with chronic low back pain.

METHODOLOGY

The statistical society of present research is involved of 30to 40 years old female patients who live in Tehran, and are suffering from chronic low back pain which their disease was declared by orthopedic doctor .researcher had collected the number of women who were suffering from low back pain and their disease was declared by orthopedic doctor. From the statistical society, 60 female patients of chronic low back pain were selected by using purposive sampling technique and 20 subjects distributed in each group. This research has been accomplished through three groups such as hydrotherapy exercise group, yoga practice group and control group. The results have shown that there was a significant improvement in movement disability (RMDQ score) in experimental groups, hydrotherapy and yoga groups ($p<0.05$); and there was a significant difference in pre and post PBU and Sorensen test in both experimental groups and also there was a significant increment in SLR score in both experimental groups ($p<0.05$),and no significant difference was found between the groups based on PBU test, Sorensen test, Schober test and RMDQ scores; but there is an exception in which the yoga treatment within SLR test , was found the better treatment than hydrotherapy treatment. Orthopedic surgeon helped researcher to find out the subjects for the research to give treatments of yoga as well as hydrotherapy exercise. These women were certified by orthopedic surgeon that they could go under this particular treatment.

Researcher has taken support from physiologist for evaluating parameters during pre and post test. Help from experts in yoga and hydrotherapy was taken to make a plan of yogic practices and hydrotherapy exercise respectively. Also, help from two trained experts was taken to give the treatment to the yoga and hydrotherapy groups separately.

TrA activation capacity was assessed by using the stabilizer pressure Biofeedback unit (PBU, Chattanooga group, Australia).The PBU consists of a combined gauge bulb connected to a pressure cell. It is a simple device that registers changing pressure in an air filled pressure cell allowing body movement, especially spinal movement, to be detected during exercise. the gauge contains 16.7 × 24 cm of inelastic material .the pressure cell measures from 0-200 mmHg. Changes in body position modify the pressure, and they are registered by the sphygmomanometer. Pre measurement, the participants received the standardized instructions about how to perform abdominal hollowing correctly. the participant lay in a prone position, arms to each side, head fully relaxed in the designated mould, so that the neck was straight and relaxed with the head in the midline .the pressure biofeedback was placed under the lower abdomen with its

distal end in line with the anterior superior iliac spine .According to Richardson and Jull, at first the bulb was inflated to a pressure of 70 mmHg. Pre each contraction, the participants were instructed to relax their whole body, especially the abdomen. Patients were asked to contract or tighten their abdominal muscles, however they sustained it for 10 seconds, and it was measured through a stop watch .Post each contraction; there was an interval of 20 seconds for the patients to rest. Changes in pressure readings were calculated from the baseline of 70 mmHg. The mean change in pressure at the end of three contractions was calculated and used in further analysis.

BASIC STUDIES

There are many muscles which act on the spine to produce movement and help to maintain posture. The main muscle groups are the flexors and the extensors. The extensors comprise small and large muscles which allow the body to straighten up .the flexor muscles, which include the abdominal muscles, are in front of the spine and allow us to bend forward and provide support to the back.The hamstrings connect to the bottom of the pelvis. If they are tight, it will inhibit your ability to flex or bend forward and puts most of the load of bending on the low back rather than distributing the load as it should be among the hamstrings, gluts, hips, and low back. The lumbar region is the area of the spine that is also the source of most movement and flexibility, and is the support structure for much of a person's body weight. Both factors often contribute to the onset of back pain, but the reasons of low back pain are varied. In most case, it is believed that the low back pain is due to a sprain or strain in the muscles and soft tissues of the back. Over activity of the muscles of the back can lead to an injured or torn ligament in the back which in turn leads to pain. An injury can also occur to one of the inter-vertebral discs. A neutral spine refers to the "three natural curves [that] are present in a healthy spine." From the anterior/posterior view the 33 vertebrae in the spinal column should appear completely vertical. The cervical region of the spine (C1-C7) is convex interiorly, the thoracic region (T1-T12) is convex posterior, and the lumbar region (L1-L5) is convex interiorly. The sacrum (S1-S5 fused) and coccyx (on average 4 fused) rest between the pelvic bones. A neutral pelvis indicates the anterior superior iliac spines and pubic symphysis fall in the same vertical line. Neutral spine is the proper alignment of the body between postural extremes. Deviations from neutral alignment are identified as excessive curvature or reduction in curvature. Rarely do these deviations in curvature occur in only one plane; however, they are typically referred to in this manner. In the anterior/posterior view, deviation from vertical results in abnormal lateral curvature of the spine called Scoliosis. Hydrotherapy is a therapeutic whole-body treatment that involves moving and exercising in water. The muscles are able to relax and the pain is usually relieved from the joints. This makes it easier to exercise.Also, the water can support weight, so pressure is taken off painful joints. This also could increase the range of movement in the joints. Finally, pushing against the water with legs and arms could improve muscle strength in the back. When the back is stronger, it is better to be able to support the spine in which the pressure would be relieved from the joints and pain would be reduced as well.the word "yoga" is originated from the Sanskrit dhatu 'yuj'.The meaning of 'yuj' is 'to join'. Therefore,yoga means joining. It is generally associated with the 'yogi' a hindu saint and sounds rather religious. Many postures in yoga strengthen the back and abdominal muscles and help the body maintain a proper upright posture and movement. stretching and relaxation reduces tension in stress carrying muscles.

Previously, Hamstring flexibility was determined by measuring SLR using the same instrumentation and method by Hall et al. In brief, HFA measurement tool involved the application of a knee extension brace and an ankle foot orthosisto maintain the knee in full extension and the ankle in neutral plantar grade.a belt was placed around the subject at the level of the anterior superior iliac spine to provide a site of attachment for the pelvic inclinometer. A second inclinometer was attached to the brace at the level of the lateral axis of the knee joint. Two inclinometers were calibrated in the starting position,and then used to measure posterior pelvic rotation and the total range of SLR. The hip flexion component of the overall measurement was considered to most closely reflect hamstring flexibility,so for the purposes of this study,HFA was defined as a difference between the total range of SLR and the range of pelvic rotation .to further standardizing the position, all subjects were positioned supine without a pillow and maintained a neutral cervical spine posture throughout the measurement procedure. To ensure consistency in all measurements, the same investigator lifted the leg passively,stopping at the point where the subject reported the onset of perceived hamstring tightness. During testing,the SLR was repeated three times and the pelvic and knee inclinometer readings were recorded. HFA was calculated for each of the three trials and a mean pre-HFA value was obtained for each subject on each value was obtained for each subject on each occasion of testing. The SLR measurement tool has been shown to be reliable in a previous study.

RONALD MORRIS DISABILITY QUESTIONNAIRE

Functional disability was estimated by the Ronald Morris disability questionnaire.Other questionnaires are available for the measurement of the evaluation of low-back pain, but Ronald Morris was considered the most appropriate in this research .RMQ is a self-administered disability measure in which greater levels of disability are reflected by higher numbers on a 24 point scale. The RMQ has been shown to yield reliable measurements, which are valid for inferring the level of disability, and to be sensitive to change over time for groups of patients with low back pain.

RESULTS AND DISCUSSION

The researcher has studied about all women patients who were suffering from back pain which these patients were took under supervision of doctor in the clinics in Tehran; and from 687 patients, 60 patients (30-40 years old) were selected for the present study. The name, date of birth and age of patients were noted and confirmed in the research. In this research, hydrotherapy exercise and yoga practices were applied on these patients in whom the patients were divided randomly into three groups. Two experimental groups and control group, each consisting of 20 students. Both hydrotherapy groups and yoga group followed similar programs, which included warm-up, stretching exercise, strengthening exercise, balance exercise and cool down. Sessions were conducted three days a week for twelve weeks. Both exercises program were given in the afternoon and they stated in the 30 minutes, and gradually the time increased to 60 minutes. In both programs, exercises were chosen that any person could do the exercises. Initially we used the easier exercises, and gradually quite difficult exercises were used. Nothing has to be applied on control group during the sessions.

The data collected with the standard procedure in which they entered into a Microsoft excel 2000 database and exported to SPSS for statistical analysis. as the researcher is interested in finding the change in selected variables based on hydrotherapy and yoga treatment, thus the change in score was calculated by subtracting the present score from the post-test score. Descriptive values were expressed as mean ± standard deviation. An analysis of variance (ANOVA) using the general linear model (GLM) procedure was conducted. P value ($p<0.05$) is considered to determine the statistical significance. Change in PBU test score of control group (M=0.40,S.D=0.51),yoga exercise group (M=-2.00,S.D=0.93) and for hydrotherapy group (M=36.19,S.D=11.35),Yoga exercise group (M=40.61,S.D=9.54),and for control group (M=-0.95,S.D=5.67). Descriptive statistics of change in RMDQ score of hydrotherapy group, yoga exercise group and for control group are presented in table 1. Negative score indicates that there is reduction in pain score as the change was calculated by subtracting the present score from posttest score.

Table 1: Descriptive statistical analysis of the change between pre test and post test

Variable	Group	Mean	Std. Dev.	Std. Error
PBU	Control	0.40	0.51	0.13
	Yoga	-2.00	0.93	0.24
	Hydro	-1.60	0.91	0.24
	Total	-1.07	1.32	0.20
Sorensen	Control	-0.95	5.67	1.46
	Yoga	40.61	9.54	2.46
	Hydro	36.19	11.35	2.93
	Total	25.28	20.87	3.11
SLR	Control	0.03	0.33	0.09
	Yoga	14.78	16.25	4.20
	Hydro	9.60	2.13	0.55
	Total	8.13	11.12	1.66
RMDQ	Control	-1.27	1.33	0.34
	Yoga	-16.80	2.91	0.75
	Hydro	-14.80	2.40	0.62
	Total	-10.96	7.33	1.09

Table 2: One way ANOVA for comparison between the change of pre test and post test

		Sum of Squares	Df	Mean Square	F	Sig.
PBU	Between Groups	49.60	2	24.80	38.294	0.001
	Within Groups	27.20	42	0.65		
	Total	76.80	44			
Sorensen	Between Groups	15627.68	2	7813.84	93.022	0.001
	Within Groups	3528.00	42	84.00		
	Total	19155.68	44			
SLR	Between Groups	1679.52	2	839.76	9.378	0.001
	Within Groups	3760.90	42	89.55		
	Total	5440.42	44			
RMDQ	Between Groups	2142.18	2	1071.09	201.07	0.001
	Within Groups	223.73	42	5.33		
	Total	2365.91	44			

An analysis of variance was conducted to explore the impact of two treatments. In this research, three treatment programs were considered that they are as control group, yoga exercise group, hydrotherapy group.As measured by PBU test, there was a statistically significant difference at $p<0.05$ level in PBU test scores for three groups [$F(2,42)=38.294, P=0.001$].the real difference in mean scores between the groups was quite large. As measured by the Sorensen test score,based on treatment program , the patients divided into three groups .there was a statistically significant difference at $p<0.05$ level in Sorensen test scores for three groups [$F(2,42)=93.022, P=0.001$]. The real difference in mean scores between the groups was quite large .as measured by SLR test, there was a statistically significant difference at $p<0.05$ level in SLR test for the three groups [$F(2,42)=9.378, P=0.001$]. The real difference in mean scores between the groups was quite large. There was a statistically significant difference in RMDQ score between the three groups at $p<0.05$ level [$F(2,42)=201.069, P=0.001$]. The real difference in mean scores between the groups was quite large. To confirm significant difference between control, yoga and hydro group, post – hoc comparisons using the Scheffe test was done.

Table 3:Scheffé Post Hoc Tests Multiple Comparisons between different groups

Dependent Variable	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.
PBU	Control	Yoga	2.40 (*)	0.29	0.001
		Hydro	2.00 (*)	0.29	0.001
	Yoga	Hydro	-0.40	0.29	0.404
Sorensen	Control	Yoga	-41.55 (*)	3.35	0.001
		Hydro	-37.14 (*)	3.35	0.001
	Yoga	Hydro	4.41	3.35	0.427
SLR	Control	Yoga	-14.75 (*)	3.46	0.001
		Hydro	-9.57 (*)	3.46	0.03
	Yoga	Hydro	5.18	3.46	0.334
RMDQ	Control	Yoga	15.53 (*)	0.84	0.001
		Hydro	13.53 (*)	0.84	0.001
	Yoga	Hydro	-2.00	0.84	0.071

post – hoc using the Scheffe test was done for finding the comparison, it indicates that the mean of the PBU test score for hydro therapy group (M=-1.60,S.D=0.91),and yoga exercise group (M=-2.00,S.D=0.93) was significantly different from the control group (M=0.40,S.D=0.51).similarly hydrotherapy and yoga exercise group did not differ significantly from each other.

Post – hoc using the Scheffe test indicated that the mean of Sorensen test score for hydrotherapy group (M=36.1933,S.D=11.34935),and yoga exercise group (M=40.6067,S.D=9.54347)was significantly different

form control group(M=-0.9467,S.D=5.66693). Similarly it was also revealed that the hydrotherapy and yoga exercise group did not differ significantly from each other (p=0.427).
Post – hoc using the Scheffe test indicated that the mean of SLR test score for hydrotherapy group (M=9.5960, S.D=2.13110), and yoga exercise group (M=14.7773, S.D=16.24757) was significantly different form control group (M=0.0287, S.D=0.33263). Similarly it was also revealed that the hydrotherapy and yoga exercise group did not differ significantly from each other (p=0.427).
Post – hoc test that the mean of RMDQ for hydrotherapy group (M=-14.8000, S.D=2.39643), and yoga exercise group (M=-16.8000, S.D=2.90812) was significantly different form control group (M=-1.2667, S.D=1.33452). Similarly it was also revealed that the hydrotherapy and yoga exercise group did not differ significantly from each other (p=0.758) in case of back pain score.

CONCLUSION

1-hydrotherpay exercises and yoga practices have shown significant effect on chronic back pain, and as a result a significant decrease of chronic low back pain was shown in the post test.
2-the significant effects of hydrotherapy exercises on trunk flexor and extensor muscles endurance, flexibility of trunk extensor and hamstring muscles was achieved.
3-reuslts showed that there is significant comparison in pre and post test, so hydrotherapy exercises could increase the endurance of trunk flexor and extensor muscles, flexibility of trunk extensor and hamstring muscles and decrease of chronic low back pain.
4- Results showed that there is significant comparison in pre and post yoga exercises on endurance of trunk flexor and extensor muscles, flexibility of hamstring muscles.

REFERENCES

1. Audrey, L. (2008). "Specific Directional Exercises for Patients with Low Back Paine" A Case Series. Physiotherapy Canada, 60 (4), pp: 98-102.
2. Best, J. W. & Khan, (2006) "Research in Education" (ed. 9). New Delhi: Prentice Hall. P: 408.
3. Chou, R., Qaseem, A., Snow, V., Casey, D., Cross, J. T., Shekelle, P., & Owens, D. K., (2007). "Diagnosis and treatment of low back pain" a joint clinical practice guideline from the American College of Physicians and the American Pain Society.Ann Intern Med, 147, pp: 478-91.
4. Dagenais. S., Mayer, J., Wooley, J. R., &Haldeman, S. (2008). "Evidence informed management of chronic low back pain with medicine-assisted manipulation". Spine, J.8 (1), pp: 142–9.
5. Ghosh, A. (1980). "Handbook of Sports Medicine and Physical Fitness". Calcutta: Allied Book Agency.
6. Lurie, J. D., Birkmeyer, N. J., Weinstein, J. N. (2003). "Rates of advanced spinal imaging and spine surgery".Spine, 28 (6),pp: 16-20.
7. Michalsen, A., Ludtke, R., &Buhring M. (2003). "Thermal hydrotherapy improves quality of life and hemodynamic function in patients with chronic heart failure". American Heart Journal, 146 (4), p: 11.
8. Michalsen, A., Ludtke, R., &Buhring, M. (2003). "Thermal hydrotherapy improves quality of life and hemodynamic function in patients with chronic heart failure". American Heart Journal, 146 (4), p: 11.
9. PadminiTekur, M.B.B.(2008)."Effect of Short-Term Intensive Yoga Program on Pain Functional Disability, and Spinal Flexibility in Chronic Low Back Pain".A RandomizedControl Study. The journal of alternative and complementary medicine.14, (6), pp: 637-644.
10. Audrey L, et al. (2008). "Specific Directional Exercises for Patients with Low Back Paine". A Case Series. Physiotherapy Canada . 60, (4), pp: 32-102.
11. Tekur P, Chametcha S, Hongasandra RN, Raghuram N.(2010). "Effect of yoga on quality of life of CLBP patients".A randomized control study. Int J Yoga, 3, pp: 10-17.
12. Maciel SC, Jennings F, Jones A, Natour J. (2009).The development and validation of a Low Back Pain Knowledge Questionnaire - LKQ. Clinics.;64, pp: 1167-75.
13. Fa´bio R. F¸ Thomaz N. B, Erica S. H, Amelia P.M(2010).Segmental stabilization and muscular strengthening in chronic low back pain - a comparative study. Clinical Science 65(10), pp: 1013-1017.
14. Richardson C, Jull G, Hodges PW, Hides JA.(1999). Therapeutic Exercise for Spinal Segmental Stabilization in Low Back Pain: Scientific Basis and Clinical Approach. 1a ed. Sydney: Churchill Livingstone.
15. Lee.H.(2003). The influence of Pilates training on the ability to contract the TransversusAbdominis muscle in asymptomatic individuals. Journal of Bodywork and Movement Therapies.9,pp: 52–57.
16. Ito T, Shirado O, Suzuki H, Takahashi M, Kaneda K, Strax TE.(1996). Trunk muscle endurance testing: An inexpensive alternative to a machine for evaluation. Arch Phys Med Rehabil;77, pp:75–9.
17. Müller R, Strässle K, Wirth B.(2010).Isometric back muscle endurance: an EMG study on the criterion validity of the Ito test.J ElectromyogrKinesiol;20(5), pp:845-50.
18. Hall T, Cacho A, McNee C, et al. Effects of the Mulligan traction straight leg raise technique on range of movement. Journal of Manual & Manipulative Therapy**,** Vol. 9, NO. 3, 2001, pp: 128-133(6).
19. Taylor D, Dalton J, Seaber A, et al. (1990).Viscoelastic properties of muscle-tendon units: thebiomechanical effects of stretching. Am J Sports Med;18, pp: 300–9.
20. Andrew R,Keith G(2004). The relationship between hamstring muscle injuries and hamstring muscle length in young elite footballers. Physical Therapy in Sport,V 5,P. 179–187**.**

21. D Hopper, S Deacon, S Das, A Jain, D Riddell, T Hall, K Briffa, and B. Vicenzino.(2005). Dynamic soft tissue mobilisation increases hamstring flexibility in healthy male subjects. Br J Sports Med. V39,pp: 594-598.
22. Exner V, Keel P. [Measuring disability of patients with low-back pain--validation of a German version of the Roland & Morris disability questionnaire] Schmerz. 2000 Dec;14(6), pp: 392-400.
23. Jirarattanaphochai K, Jung S, Sumananont C, Saengnipanthkul S.(2005).Reliability of the Roland - Morris Disability Questionnaire (Thai version) for the evaluation of low back pain patients. J Med Assoc Thai. 2005 Mar;88(3),pp:407-11.
24. Rolan M, Fairbank J. (2000). The Roland – Morris Disability questionnaire and the Oswestry Disability Questionnaire. Spine; 25,pp:3115-24.

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