

Investigating the Effect of the Routine Physical Therapy with and without Reflexology on the Level of Pain, Disability and Endurance of the Trunk Extensor and Flexor Muscles in Subjects with Chronic Nonspecific Low Back Pain

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Abstract

Introduction: low back pain is one of the most common and expensive musculoskeletal disorders which due to its disability, the health care system is faced with great problems such as social and remedial ones. Different methods are used in order to alleviate the pain. One of the most common way to alleviate the complications of the low back pain is the foot reflexology. The aim of this study is to investigate the effect of adding this kind of treatment as an inexpensive nonaggressive way to the routine physical therapy plan. **Methods and Materials:** In this quasi experimental study, 30 women with chronic nonspecific low back pain returned to physiotherapy clinic in Tehran, first were selected by purposive sampling then they with random allocation method had been divided to two groups: routine physiotherapy (electrotherapy and strength training of flexor and extensor muscles) and routine physiotherapy plus foot reflexology. The amount of pain and functional disability and flexor and extensor endurance were measured by VAS and Oswestry disability questionnaire and ITOO test before, just after 8 weeks treatment and with a month interval after intervention. Data were analyzed using repeated measure ANOVA. The statistical significance was resumed to be a $P < 0.05$. **Results:** Before intervention anthropometric, quantitative, and qualitative specifications were not significantly different between two patients groups participating in this study. Immediately after completing their physiotherapy treatment plan, although the pain and disability reduction were seen in both groups, the reflexology group was better than routine physiotherapy ($P < 0.05$). Endurance of trunk muscles was not significantly different in both groups. A month after the final physiotherapy session, the pain, disability and endurance were not significantly different between two groups ($P > 0.05$). **Conclusion:** Adding reflexology to the treatment plan had a positive effect only for a short term in improving the pain and disability, but in long term, applying reflexology besides the routine physiotherapy treatment had no additional effect and the routine results were established. Future studies with more subjects and in acute low back pain is recommended.

Key words: Chronic Nonspecific Low Back Pain; Reflexology; Pain

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Introduction

Backache is one of the most common and costly musculoskeletal disorders that disability caused by that is among the most important health and social problems. Chronic backache has been reported as a complication in people's life (1). Chronic backache provides the context for reducing the quality of life (2). People with chronic backache confront many problems, including social and economic problems (3). This indicates that backache is an important clinical, social, and economic issue (4). In patients with backache, the pain is usually reported in the lower lumbar or

lumbosacral regions (5). Backache is associated with various symptoms that are reported as burning or stinging pain and cramping, and the symptoms of backache vary depending on its causative agent (6). The pathophysiology of backache is not fully identified (7). However, some factors play a role in the development of backache (6). Which these factors are divided into two categories: specific or pathological and non-specific or mechanical. On the other hand, 20% progress to chronicity (8). Backache in chronic status causes a variety of problems and complications, including decreased range of motion, decreased strength and muscular tolerance, and pain and disability (9).

Table 1. Comparing demographic features between two groups

	Number	Minimum	Maximum	Mean (SD)	P-value
First group	15	42	51	46.54 (13.57)	0.74
Second group	15	43	50	46.12 (13.8)	
First group	15	65	80	72.8 (5.23)	0.56
Second group	15	62	81	73.46 (5.86)	
First group	15	155	179	167.46 (7.01)	0.81
Second group	15	155	180	167.53 (7.79)	
First group	15	24/34	27/24	29.95 (1)	0.32
Second group	15	24/07	29/75	26.18 (1.46)	

Table 2. Comparing the mean data post-treatment and after one month of post-treatment with pre-treatment in both groups

		Endurance of extensor muscles of body in terms of second			Endurance of flexor muscles of body in terms of second		
		Before	After intervention	After one month	Before	After intervention	After one month
Routine group	treatment	17.33±2.22	22.24±2.03	22.02±1.96	20.94±4.16	25.59±3.86	26.12±4.35
Routine group	treatment plus reflexology	17.56±2.56	22.40±2.68	22.12±2.23	21.15±3.94	25.61±4.12	26.66±4.73

Chronic backache can lead to disability (10). In patients with chronic backache, lack of adequate strength in the muscles of the lumbar region and hip and reduced flexibility in the lumbar region in long-term postures can lead to micro-trauma, inflammation and pain in these patients over time (11). The pattern of use as well as the duration of muscle activity play a major role in stabilizing the lumbar spine (12). In many studies, delayed response time after sudden loading in the lumbar spine muscles has been observed in patients with chronic backache (12). Therefore, there is a relationship between sudden or unexpected movements and lumbar injuries (11).

JiHae Kim *et al.* reviewed lumbar stabilization exercises using sling. One group performed lumbar stabilization exercises with routine physiotherapy 4 times a week and the other group performed only routine physiotherapy 4 times a week. The results showed that scores related to pain and disability significantly were reduced in both groups after the intervention and the pain score was significantly different between the two groups (13).

In a study by Min-Yeong Heo *et al.* a group performed lumbar stabilization exercises, the second group performed Thoracic mobilization with exercise, and the third group performed routine physiotherapy. The results of this study showed that pain scores were improved significantly in all three groups. In a study by Hyun Sill Rheol *et al.*, spinal stabilization exercises were used to reduce pain and disability in patients with chronic backache. The level of pain was significantly reduced before and after therapeutic intervention for the routine treatment group and the spinal stabilization exercises group. In relation to the degree of disability, in this

study, the scores related to disability were also improved both in the group of spinal stabilization exercises and in the group of routine treatment (15).

Various methods can be used in patients with backache. One of the effective methods to reduce the complications of backache is foot reflexology, which is a therapeutic and diagnostic method (61). In diagnosis and treatment, reflexology examines the potential of specific areas of the skin surface that are named as reflexology or reflex areas, which introduce the structural and functional dimensions of various areas of the body (17). It is assumed that Ira's special skin inputs provide non-invasive therapeutic intervention through external stimulation in separate forms and at different intensities (71). It assumes in reflexology that specific surface areas of the body, which attached to internal parts of the body, differentiate the functional state of the target organs and adaptively, create physical symptoms (81). External surface features that have been observed alone or in combination with reflexology are expressed as follows: 1) tenderness in response to pressure 2) skin color 3) tissue and consistency 4) inflation formation 5) an increase in localization temperature (15). Reflexology is performed on the reflection points on the soles of the feet and palms of the hands in order to make biophysical changes in the body (15). Reflexology with the use of pressure on the reflex points on the soles of the feet is attributed to the relaxing effects of reflexology in order to other areas associated with these points (18). It is said that conducting reflexology of the foot causes to release the energy in the channels, which these channels are connected to the sole of the foot from all parts of the body through the neural pathways (19).

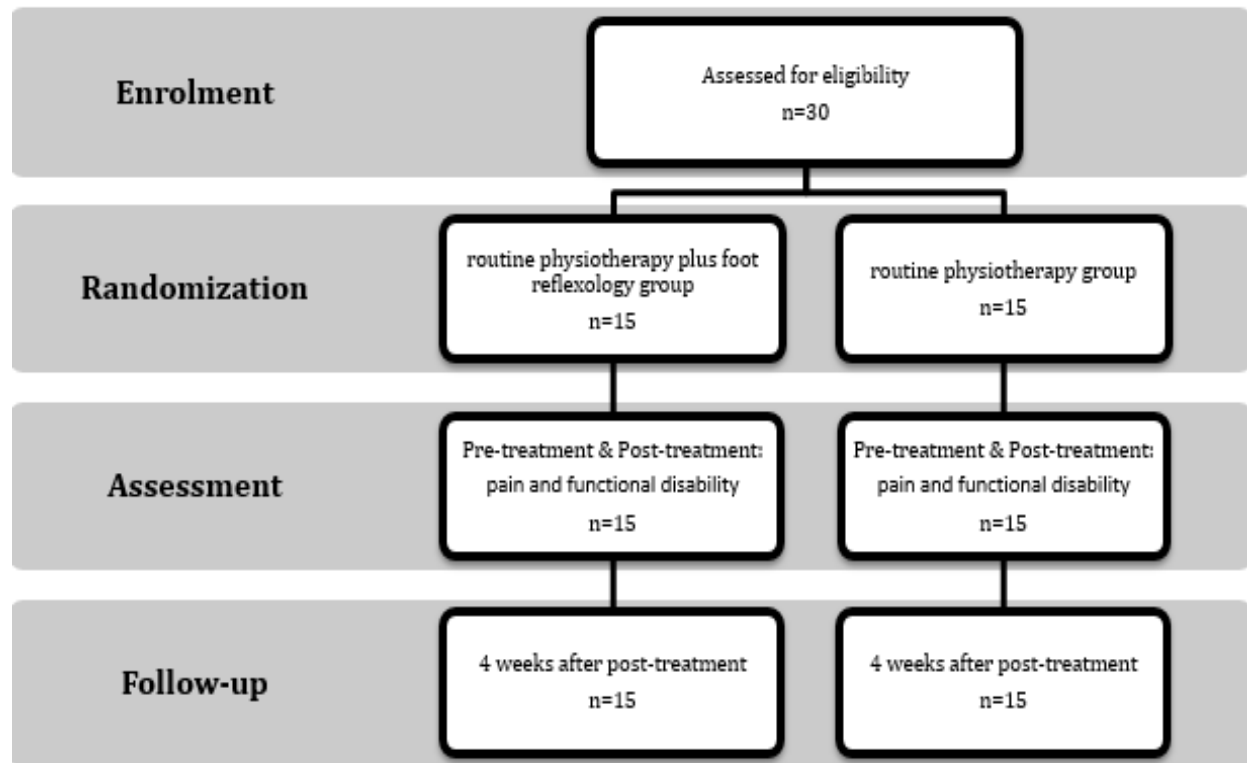


Figure 1. Fludiagram of patients participating in the study

There is a lack of adequate information on the correct diagnosis and treatment for people with chronic backache. Reflexology has a comprehensive effect, i.e. in addition to reducing physical problems, it also affects humans psychologically (1). On the other hand, since no study as clinical trials have examined the additional effect of flexology with routine physiotherapy, so the aim of this study is to investigate the effect of adding reflexology as a low-cost and non-invasive treatment for routine physiotherapy in patients with backache. It was assumed that foot reflection massage and treatment in the control group caused to improve pain, disability, and endurance of the flexor and extensor muscles of the body. Also, the effect of reflexology group in improving pain, disability and endurance is more than control group.

Materials and Methods

In this semi-experimental study, 30 female patients with chronic non-specific backache in the range of 30 to 60 year-old were selected through available sampling among clients referring to the physiotherapy clinic and were randomly divided in to one of two groups of routine physiotherapy control (20), includes electrotherapy plus strengthening exercises of flexor and

extensor of the body(15 people) as well as the intervention group received combination therapy including reflexology plus routine physiotherapy (15 people), which these 30 patients were present without any falling until the end of treatment and completed the study. Using previous studies, the sample size was estimated to be 30 people for two groups (15 people per group) (13). This study was approved by the Scientific Committee of the Rehabilitation Department and the Ethics Committee of Shahid Beheshti University of Medical Sciences.

Inclination criteria to the study: inclination criteria were lack of medication treatment during the study and no intensive physical activity during the study for women with a history of backache with non-specific reason for more than three months who were selected by orthopedic and neurology specialists, as well as specific tests and re-evaluations by a physiotherapist. If people had vertebral fractures, pregnancy, previous spinal surgery, and severe spinal deformities (1), neurological and rheumatologic diseases (1), were excluded from the study. Individuals who did not regularly complete their assessment and therapeutic sessions, or experienced injuries or other illnesses during treatment were also excluded from the study. The amount of pain, disability, and endurance of the body muscles were evaluated by the visual analog scale (VAS), the

disability questionnaire (Oswestry) (21) and the Itoo test (ITOO) (4, 22) before, after eight weeks of treatment and one month after ending physiotherapy treatment. Individuals in the control group received routine physiotherapy treatments (electrotherapy and strengthening exercises for the abdominal and lumbar muscles) (20), and people of the intervention group received reflexology for 30 minutes per session in addition to routine treatments. In each session, massage was performed in the first ten minutes by relaxation method and later 15 minutes on the areas related to the lumbar and auxiliary areas. In the last 5 minutes, the whole leg (20) was massaged. Data distribution compliance to the natural distribution was checked with the Shapiro Wilk test. Data were recorded in SPSS software version 18 and analyzed by repeated measured ANOVA statistical test and independent t-test for intergroup comparison. A significance level was considered less than five percent.

Results

Before the intervention, anthropometric data did not significantly differ between the two groups of participants in the study ($P>0.05$). The flow chart of the patients participating in the study is shown in Figure 1

The mean of age range, weight, height and body mass index in the two groups of intervention and control are given in Table 1. The results of the normality test showed that the distribution of all data is normal.

Immediately after the end of physiotherapy sessions, a significant improvement has been shown in pain and disability in both groups after the intervention ($P<0.05$), but the reflexology group showed more pain reduction (5%) ($P=0.006$), while in the routine physiotherapy group, no significant pain reduction was reported ($P=0.61$). Both groups of endurance showed improvement, but no significant difference was observed between the two groups in terms of endurance of body muscles. One month after the end of the physiotherapy sessions, there was no difference between two groups in terms of pain and disability and endurance of the body muscles (Table 2) ($P>0.05$).

Discussion

Backache is a common musculoskeletal problem in the industrial and medical community (18) About 70-80% of

people experience this disorder once or more in their life (1). Over 80% of adults in the United States suffer from this complication in their life (19). The prevalence of backache in Iran is also high and is estimated to be between 14.4% and 84.1% (23). Chronic backache has been reported as a complication and provides a context for reducing quality of life, pain, and disability (24).

The results of this study support the first hypothesis of the study based on that foot reflection massage and treatment in the control group cause to improve pain, disability and endurance of flexor and extensor muscles of the body. However, contrary to the second hypothesis of the study, there was no difference between the two therapeutic methods in terms of disability and endurance variables, except the pain index, which was improved in the reflexology group. The results of our study showed that in the reflexology group, pain, disability and endurance of flexor and extensor muscles of the body were improved. The control group also reported improvement in the variables of pain, disability, and endurance, but the only pain index in the reflexology group was higher than the control group.

Je HaeKim *et al* examined the effect of stabilization exercises using sling and routine physiotherapy on pain and disability index in patients with chronic backache, which the results of this study were consistent with the results of the our study, and clinical evaluation before and after sling exercises showed that the mean pain and disability rates of their scores were significantly reduced in both groups after exercise and the pain score was significantly different between the two groups. It can be concluded that sling exercises cause to reduce the load on the spine and also reduce the amount of stimulation to the ligaments and joint cavities, which these tissues are sensitive to pain (13). Study of Jin Mo Yang *et al* was consistent with our study. This is because they reported significant differences in mean score of pain and disability in both vibration and control groups. But, in intergroup comparison, improvement in the mean pain score in the vibration group was found compared to the control group (14). The overall vibration of the body stimulates receptors pacinian corpuscles and meissner corpuscles, and following that stimulates interneurons in the spinal cord and this stimulation is done by signals that these signals are sent through beta a fibers and inhibits the pain transmitted by C-fiber and A-fiber delta (14). The overall vibration of the body reduces pain and disability, which is done by improving functional disorders caused by backache and by activating muscle contractions by stimulating the somatosensory system (14).

In a similar study by Mughar *et al* (25), which used reflexology without physiotherapy treatment on patients with backache, they observed that reflexology had a positive effect on pain relief, while this reduction in pain was observed immediately after ending the treatment, which this result is consistent with the findings of the present study, but in the long-term we observed that the addition of reflexology has no additional effect on routine treatment.

In a study conducted by Eghbali *et al*, the effects of reflexology on patients with chronic backache were considered, and one group carried out routine physiotherapy and another group carried out reflexology, and the treatment sessions lasted 40 minutes and conducted for 2 weeks and achieve to this conclusion that reflexology is effective in reducing the severity of pain in patients with chronic backache, and the results of this study are consistent with our study (26).

With regard to this matters, it can be said that reflexology, along with routine physiotherapy, is effective in patients with chronic backache to improve pain, disability and endurance of flexor and extensor muscles of the body, although there was no difference between the two groups except for the pain index, which this matter can be due to the small number of samples in this study, so it is recommended that more samples will be used to in future research to determine the best effect of this treatment method, and it is also better to use this therapeutic method in patients with acute backache.

Conclusion

The findings of present study confirm the temporary efficacy of combination therapy in the severity of pain in patients with chronic backache. With regard to the findings of this study, the addition of reflexology only had a positive effect on pain relief in the short-term, while doing reflexology did not have an advantage over routine treatment in the long-term after one month. Physiotherapists can reduce the patient's pain in the short term by performing complementary medicine techniques, but this reduction of pain is not equivalent to reducing long-term pain or increasing endurance of the body muscles. Future research is recommended by selecting more samples and patients with acute backache.

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References

1. Santos FG, Carmo CM, Fracini AC, Pereira RR, Takara KS, Tanaka C. Chronic low back pain in women: muscle activation during task performance. *Journal of physical therapy science*. 2013;25(12):1569-73.
2. Marras W. Occupational low back disorder causation and control. *Ergonomics*. 2000;43(7):880-902.
3. Costa F, Fonseca G, Ferrão Y, Zylbersztejn S. Avaliação fisioterapica da lombalgia cronica organica e nao organica. *Coluna/Columna*. 2008;7(3):191-200.
4. Silva MCd, Fassa AG, Valle NC. Chronic low back pain in a Southern Brazilian adult population: prevalence and associated factors. *Cadernos de saude publica*. 2004;20(2):377-85.
5. Braga AB, Rodrigues ACdMA, de Lima GVMP, de Melo LR, de Carvalho AR, Bertolini GRF. Comparison of static postural balance between healthy subjects and those with low back pain. *Acta ortopedica brasileira*. 2012;20(4):210.
6. Balagué F, Mannion AF, Pellisé F, Cedraschi C. Non-specific low back pain. *The lancet*. 2012;379(9814):482-91.
7. Wilder DG, Vining RD, Pohlman KA, Meeker WC, Xia T, DeVocht JW, et al. Effect of spinal manipulation on sensorimotor functions in back pain patients: study protocol for a randomised controlled trial. *Trials*. 2011;12(1):161.
8. Brech GC, Andrusaitis SF, Vitale GF, Greve JMDA. Correlation of disability and pain with postural balance among women with chronic low back pain. *Clinics*. 2012;67(8):959-62.
9. Ruhe A, Fejer R, Walker B. Center of pressure excursion as a measure of balance performance in patients with non-specific low back pain compared to healthy controls: a systematic review of the literature. *European Spine Journal*. 2011;20(3):358-68.
10. Weiner DK, Rudy TE, Morrow L, Slaboda J, Lieber S. The relationship between pain, neuropsychological performance, and physical function in community-dwelling older adults with chronic low back pain. Blackwell Publishing Inc Malden, USA; 2006.
11. Leinonen V, Kankaanpää M, Airaksinen O, Hänninen O. Back and hip extensor activities during trunk flexion/extension: effects

- of low back pain and rehabilitation. Archives of physical medicine and rehabilitation. 2000;81(1):32-7.
12. Gao Y, Shi J-g, Ye H, Liu Z-r, Zheng L-b, Ni Z-m, et al. Adaptation of muscles of the lumbar spine to sudden imbalance in patients with lower back pain caused by military training. The journal of spinal cord medicine. 2014;37(6):774-81.
 13. Kim JH, Kim YE, Bae SH, Kim KY. The effect of the neurac sling exercise on postural balance adjustment and muscular response patterns in chronic low back pain patients. Journal of physical therapy science. 2013;25(8):1015-9.
 14. Heo M-Y, Kim K, Hur B-Y, Nam C-W. The effect of lumbar stabilization exercises and thoracic mobilization and exercises on chronic low back pain patients. Journal of physical therapy science. 2015;27(12):3843-6.
 15. Rhee HS, Kim YH, Sung PS. A randomized controlled trial to determine the effect of spinal stabilization exercise intervention based on pain level and standing balance differences in patients with low back pain. Medical science monitor: international medical journal of experimental and clinical research. 2012;18(3):CR174.
 16. Lee Y-M. Effects of self-foot reflexology on stress, fatigue, skin temperature and immune response in female undergraduate students. Journal of Korean Academy of Nursing. 2011;41(1):110-8.
 17. White A. Clinical Reflexology: A Guide for Health Professionals. Focus on Alternative and Complementary Therapies. 2002;7(4):414-.
 18. Dalal K, Elanchezhiyan D, Das R, Dalal D, Pandey RM, Chatterjee S, et al. Noninvasive characterisation of foot reflexology areas by swept source-optical coherence tomography in patients with low back pain. Evidence-Based Complementary and Alternative Medicine. 2013;2013.
 19. Kumar S, Beaton K, Hughes T. The effectiveness of massage therapy for the treatment of nonspecific low back pain: a systematic review of systematic reviews. International journal of general medicine. 2013;6:733.
 20. Van Middelkoop, Marienke, et al. "A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain." *European Spine Journal* 20.1 (2011): 19-39.
 21. Mousavi SJ, Parnianpour M, Mehdian H, Montazeri A, Mobini B. The Oswestry disability index, the Roland-Morris disability questionnaire, and the Quebec back pain disability scale: translation and validation studies of the Iranian versions. Spine. 2006 Jun 15;31(14):E454-9.
 22. Demoulin C, Vanderthommen M, Duysens C, Crielaard JM. Spinal muscle evaluation using the Sorensen test: a critical appraisal of the literature. Joint Bone Spine. 2006 Jan 1;73(1):43-50.
 23. Mousavi SJ, Akbari ME, Mehdian H, Mobini B, Montazeri A, Akbarnia B, et al. Low back pain in Iran: a growing need to adapt and implement evidence-based practice in developing countries. Spine. 2011;36(10):E638-E46.
 24. Hicks GE, Gaines JM, Shardell M, Simonsick EM. Associations of back and leg pain with health status and functional capacity of older adults: findings from the retirement community back pain study. Arthritis Care & Research: Official Journal of the American College of Rheumatology. 2008;59(9):1306-13.
 25. Movaghar MH, Hashemi Javaheri AA, Ebrahimi Atri A. The Effect of Foot Reflexology on the Reduction of Chronic Low Back Pain. Iranian Journal of Health and Physical Activity. 2012;3(2).
 26. Eghbali ME, Nazari F, Safari R, Abdoli S. The effect of reflexology on pain perception aspects in nurses with chronic low back pain in Isfahan. Iranian journal of nursing and midwifery research. 2016;21(5):487.