Original Article

The Effect of Swedish Massage Combined with Exercise Therapy on Nonspecific Low Back Pain in the Elderly: A Randomized Controlled Clinical Trial

Mohammad Afshar, Zohreh Sadat, Leila Shokrollahi[1], Elaheh Mianehsaz[2]

Trauma Nursing Research Center, Nursing and Midwifery Faculty, Kashan University of Medical Sciences, [1]Department of Medical and Surgical Nursing, Nursing and Midwifery Faculty, Kashan University of Medical Sciences, [2]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Kashan University of Medical Sciences, Kashan, Iran

ORCID:

Mohammad Afshar: http://orcid.org/0000-0003-1326-6337

Zohreh Sadat: http://orcid.org/0000-0002-8408-0786

Abstract

Aims: The aim of this study was to determine the effect of Swedish massage combined with exercise therapy on nonspecific low back pain (NSLBP) in older adults. **Materials and Methods:** This randomized controlled clinical trial was carried out on 70 elderly people with NSLBP. Participants were assigned randomly to the intervention and control groups. The interventional group was treated using Swedish massage combined with exercise therapy, while the control group was treated using exercise therapy alone. The Visual Analog Scale (VAS) and the Quebec Back Pain Disability Scale (QBPDS) were used to determine the severity of low back pain (LBP) and the LBP disability, respectively. All participants were completed LBP and QBPDS scales for three times (at the beginning and the end of the intervention as well as 4 weeks after completion of the intervention). **Results:** It was seen that the participants in the intervention and control groups were similar in baseline scores of VAS and QBPDS. Using repeated measures analysis of variance, the comparison of the mean scores of both the scales in the two groups indicated that the scores decreased significantly ($P < 0.05$) in the intervention group compared to the control group at the second and the third measurements. **Conclusion:** The findings indicated that the Swedish massage combined with exercise therapy could be more effective for reducing LBP and back pain disability compared to exercise therapy alone. Further studies are needed to reach more evidence.

Keywords: Exercise, low back pain, Swedish massage, therapy

Introduction

Low back pain (LBP) is one of the most common musculoskeletal disorders and the leading cause of disability in most countries. More than 84% of people worldwide experience this common medical problem during their lifetime.[1] By definition, the history and physical examination do not suggest a more specific diagnosis, and diagnostic tests are used to exclude other likely causes of specific LBW, such as radiculopathy, lumbar disc herniation, lumbar canal stenosis, LBP due to trauma, malignancy, and rheumatic diseases.[2] The duration of the pain, in chronic LBP, is more than 12 weeks.[1,3] Evidence suggests that about 70%–85% of the elderly suffer from LBP, of which 10%–20% develop chronic LBP syndrome.[4,5] LBP has adverse effects on people's physical and mental health.[6,7] This is particularly important in the elderly, because LBP can affect negatively on their motor function, sleep quality, depression, disturbances, and disability.[8-10] Frequently, nonspecific LBP (NSLBP) patients have muscle weakness; pelvic floor muscle weakness is closely related to the pain severity.[4,11]

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Address for correspondence: Dr. Zohreh Sadat, Trauma Nursing Research Center, Nursing and Midwifery Faculty, Kashan University of Medical Sciences, Kashan, Iran.
E-mail: sadat_z2003@yahoo.com

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Various pharmacological and nonpharmacological methods, including heat and cold therapy, ultrasound therapy, acupuncture, behavior therapy, exercise therapy, and massage, are used to treat nonspecific chronic LBP.[12] Various strengthening and stretching exercises that focus on strengthening the abdominal, low back, and hip muscles and increasing flexibility have been found to be effective in the treatment of nonspecific chronic LBP.[13] Massage therapy refers to the superficial or deep manipulation of muscles and connective tissue, which improves muscle function by increasing blood flow, reducing stress hormones, and increasing endorphin levels; improves the lymphatic circulation system; optimizes oxygen delivery to the tissues; releases tissue adhesions; and regulates muscle tone.[14-16] Numerous studies have reported the positive effect of massage, especially Swedish massage in treating chronic LBP.[17,18]

However, limited studies have compared exercise therapy with a combination of Swedish massage and exercise therapy alone in the treatment of LBP, especially in elderly people. Bellido-Fernández *et al*. concluded that the use of massage therapy combined with abdominal exercises in adults with nonspecific chronic LBP leads to short-term improvement of the LBP-related disability, pain relief, compared to exercise therapy alone.[19] Furthermore, other researchers suggested that massage therapy combined with stretching and strengthening exercises was more effective than exercise alone in reducing pain intensity and pain-related disability.[20,21] However, Tanorsaz *et al*. reported that both massage therapy and water-based exercises were effective in relieving LBP in the elderly and they did not find any significant differences between the two methods.[22]

Comparison studies related to Swedish massage in combination with exercise therapy or exercise therapy on NSLBP in elderly patients are limited. Therefore, the aim of this study was to assess the effectiveness of Swedish massage in combination with exercise therapy and exercise therapy alone on NSLBP in elderly patients.

Materials and Methods

This is a single-blind randomized, controlled clinical trial that was performed on elderly people with NSLBP and aged 60 years or older from January to May 2020. Participants were selected out of people referring to all comprehensive health centers and private and public clinics in Kashan city with LBP who were referred to a physical medicine specialist for treatments in Shahid Beheshti Hospital (the fourth author). Then, patients with NSLBP who needed exercise therapy were referred to two physiotherapy centers (Novin and Bouali), as a place for doing research.

The inclusion criteria for participants were as follows: elderly people aged 60 years or older, having NSLBP, those who according to the physiotherapist did not have prohibited for doing Swedish massage and intended exercises, the minimum score of LBP ≥3 based on a Visual Analog Scale (VAS), the disability score ≥25 based on the Quebec Back Pain Disability Scale (QBPDS), suffering from back pain at least 3 months before enrollment, having no known mental disorder, and not receiving the other complementary therapies program from 3 months ago. The exclusion criteria were as follows: unwillingness to continue in the study, physical problems occurred after entering the study that the participation is prohibited by a physiotherapist, missed more than two massage and/or exercise sessions, and in case of severity of LBP increases.

The sample size was calculated according to the differences of mean LBP score before and after the study, as 2.45 ± 1.11 and 1.65 ± 1.00 in the intervention and control groups, respectively, according to the same.[23] Considering $\alpha = 0.05$ and $\beta = 0.1$, the sample size was calculated 30 participants for each group. Considering a possible attrition rate of 15%, the optimal sample size was estimated to be 35 participants in each group.

A total of 101 people with NSLBP were evaluated regarding the eligibility to enter the study. Twenty-one people were excluded from the study due to the failure to meet the criteria ($n = 21$) and 10 ones decline to participate. We enrolled 70 eligible patients who were randomly assigned to two groups of intervention and control by block randomization [Figure 1].

A three-part instrument was used for data collection. The first part included demographic characteristics (age, sex, marital status, education, job, number of children, and underlying disease); the second and the third parts were VAS and QBPDS scales. VAS is a scale for measuring the severity of LBP. It consisted of a ruler 10 cm that descriptors were placed at each end of the ruler (0 = no pain and 10 = the worst pain imaginable). The patient marked on the ruler according to the intensity of his/her LBP experienced in the past 24 h. The VAS is a valid and applicable tool and its reliabilities are reported 0.91 for the original scale[24] and 0.82 for the Persian version.[25] The QBPDS is a scale developed to measure the level of LBP-related disability which comprises 20 items rated on a six-point scale from 0 to 5 (0 = not difficult at all and 5 = unable to do). This scale provides a total disability score from 0 (not being disabled) to 100 (being maximally disabled).[26] The Persian version of the QBPDS is a reliable and valid instrument to measure LBP-related disability (the Cronbach's $\alpha = 0.92$).[27] The participants completed all part instrument characteristics at the beginning of the study, and then, they completed both the second and third part instruments at the end of the 4th and 8th weeks after the study. As some of the subjects were illiterate or low literate, the research assistance read them the items and documented their answers.

The intervention group received the Swedish massage before the exercises for 20 min, three times a week for 4 weeks by a male or female physiotherapist (same-sex with the patients). The Swedish massage used in this study consisted of five techniques: (1) effleurage, (2) petrissage, (3) friction, (4) tapotement, and (5) vibration [Figure 2]. As well as participants in control group received five exercises, three times a week for 4 weeks under the supervision of a

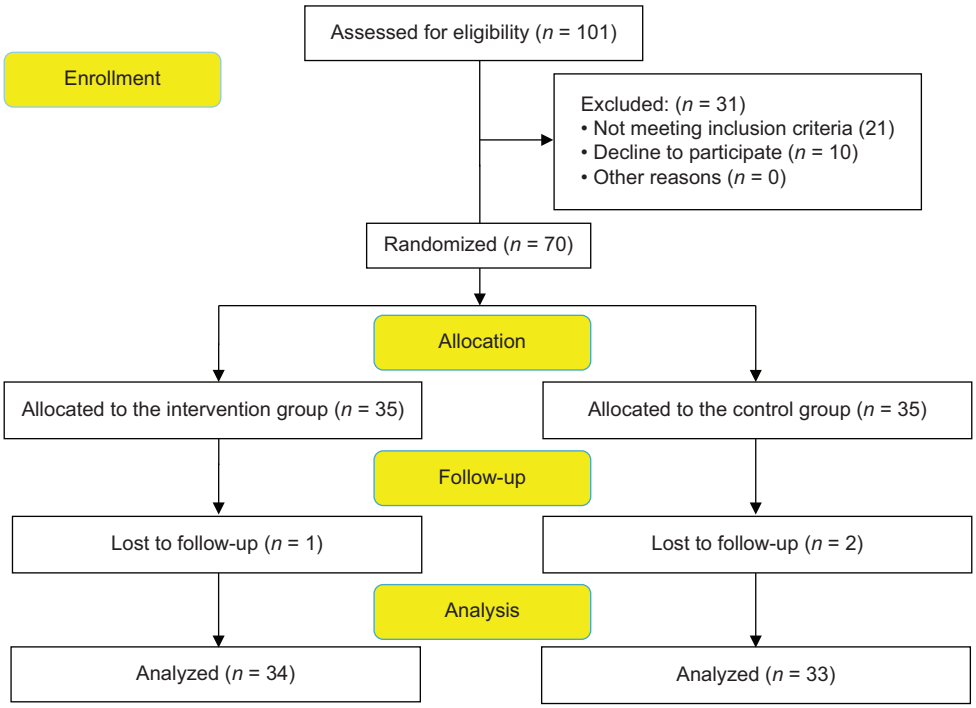

Figure 1: CONSORT flow diagram

Figure 2: 1,2) Effleurage, 3) Petrissage, 4) Friction, 5) Tapotement, and 6) Vibration

physiotherapist. It should be mentioned that liquid paraffin oil (5–10 ml) was spread on the patients' waist as a lubricant before performing the massage. After receiving the massage, the patients in the intervention group rested for about 5–10 min, and then, they conducted exercise therapy under the supervision of a physiotherapist. The exercises performed included (1) hamstring stretch, (2) the single knee to chest, (3) double knees to chest, (4) the posterior and anterior pelvic tilt, and (5) partial sit-up. The participants in the two groups received all of the exercises in 12 sessions (three sessions per week for 4 weeks). They were instructed to rest 2 min between each exercise, and the number of repetitions gradually increased over the weeks, so that the hamstring stretch performed three repetitions with a 15-s hold in the 1st and the 2nd weeks, and it changed to three reputations with a 30-s hold in the 3rd and 4th weeks. All other exercises were performed five repetitions with a 10-s hold in the 1st and 2nd weeks, and it changed to ten repetitions with a 10-s hold in the 3rd and 4th weeks in two sets with a 2-min rest between sets. The rest time between each repetition was similar to the holding time. Patients were informed to stop the movements if they felt any pain or burning in the muscles or joints.

This study was approved by the Research Ethics Committee of Kashan University of Medical Sciences. All participants were informed about voluntary participation and filled out the informed consent form.

Statistical analyses were performed using SPSS software version 16 (SPSS Inc., Chicago, IL, USA). The two groups were compared in terms of quantitative variables using analysis of variance (ANOVA) and independent samples *t*-test. The ANOVA for repeated measures test was used to examine the changes in LBP and back pain disability scores during the three measurement time points. We used the intention-to-treat analysis and reported the results only based on the per-protocol analysis. For all analyses, the statistical significance level was considered below 0.05.

Furthermore, the study protocol was approved by Kashan University of Medical Sciences (Code of Ethics: IR. KAUMS. NUHEPM. REC.1398.035) and was registered in the Iranian Registry of Clinical Trials with code IRCT20200125046246N1.

Results

Of the 70 participants who were recruited, 67 participants completed the study. One sample from the intervention group and two samples from the control group withdrew from the study.

The mean age of participants in the intervention and control groups was 65.94 ± 5.28 and 66.91 ± 6.06 years. 85.3%

and 75.8% of participants were female in the two groups, respectively. Other data are presented in Table 1. The results of repeated measures analysis showed that Swedish massage in combination with exercises significantly decreased the mean VAS and QBPDS scores in the intervention group. The *t*-test showed that the mean scores of VAS and QBPDS were significantly different between the intervention and control groups at the second and the third measurements [Tables 2 and 3]. The scores of VAS in two times measurements were 2.65±0.95 versus 4.76 ± 1.22 and 2.74 ± 1.05 versus 4.64 ± 1.08, respectively. The scores of QBPDS were 56.94 ± 14.01 versus 46.32 ± 12.76 and 57.36 ± 13.87 versus 46.56 ± 12.87, respectively.

Discussion

The present study aimed to compare the effect of Swedish massage in combination with exercise therapy and exercise therapy alone on chronic NSLBP in elderly people.

The results of the present study indicated that, by receiving a 4-week intervention of massage and exercise, the combination of both the interventions was more effective than exercise therapy alone in reducing NSLBP and disability related to it.

Bellido-Fernández *et al*. conducted a pilot study on 27 people with chronic NSLBP, they investigated the effect of massage therapy, abdominal hypopressive gymnastics, and the combination of both to reduction LBP and lumbar disability. Consistent with the results of the current study, they suggested that the combination therapy makes more effect on lumbar disability.[19] Zhang *et al*. conducted a similar study on two 46-member groups of Chinese people who underwent Chinese massage and stabilization exercises (intervention group) and massage therapy (control group). NSLBP was compared between the two groups immediately and 8 months after the intervention. Results showed that a combined intervention was more effective than massage therapy alone.[28] Another study was performed by Shakeri *et al*. on 30 middle-aged men with chronic NSLBP who underwent stabilization exercises, massage therapy, and a combined intervention of both exercises. The results of this study indicated that the combined intervention was more effective in reducing pain.[20] Another researcher indicated that the combination of massage and exercise had a greater positive impact on LBP and tissue blood circulation compared to exercise alone.[29]

Contrary to the results of the current study, a study in Italy was performed on 20 women with fibromyalgia who underwent a combined intervention of gentle massage and passive stretching exercises. They concluded that this intervention was not effective on patients' pain intensity and quality of sleep.[30] Tanorsaz *et al*. conducted a clinical trial on elderly women in three groups of control, water-based exercise, and massage therapy. They aimed to determine the effect of massage and water-based on spinal flexibility, LBP, and pain-related disability. They suggested that there was a significant difference in pain intensity before and after the intervention in two groups of massage and water-based

Table 1: The demographic characteristics of the patients in the intervention and control groups

Variable	Intervention ($n=34$), mean±SD[a]	Control ($n=33$), mean±SD	*P*
Age (year) (95% CI)	65.94±5.28 (64.29-67.87)	66.91±6.06 (64.85-68.97)	*T*=0.69 *P*=0.48
Number of children[a] (95% CI)	4.00±1.70 (3.40-4.61)	3.94±1.47 (3.43-4.42)	*T*=0.15 *P*=0.87
Sex			
Female	29 (85.3)	25 (75.8)	χ^2=0.97
Male	5 (14.7)	8 (24.2)	*P*=0.32
Marital status			
Married	28 (82.4)	26 (78.8)	χ^2=0.13
Unmarried	6 (17.6)	7 (21.2)	*P*=0.71
Education			
Illiterate	16 (47.1)	18 (54.5)	χ^2=0.95
Elementary	12 (35.3)	11 (33.3)	*P*=0.89
High school	5 (14.7)	3 (9.1)	
Higher education	1 (3.0)	1 (2.9)	
Job			
Homemaker	26 (76.5)	22 (66.7)	χ^2=1.65
Employed	2 (5.9)	1 (3.0)	*P*=0.43
Retired	6 (17.6)	10 (30.3)	
Underlying disease			
Yes	3 (8.8)	5 (15.2)	Fisher's exact=0.63
No	31 (91.2)	28 (84.8)	*P*=0.47

[a]SD. *T*: Independent samples *t*-test, χ^2: Chi-squared test, SD: Standard deviation, CI: Confidence interval

Table 2: Comparison of the mean of low back pain score by the Visual Analog Scale before, immediately after the last session, and 4 weeks after the study in the two groups

Variables	Mean±SD (95% CI)			RM ANOVA, *P*		
	Before the intervention	At the end of the intervention	4 weeks after the intervention	Time	Time×group	Group
Intervention group	5.38±1.37 (4.91-5.86)	2.65±0.950 (2.32-2.97)	2.74±1.05 (2.39-3.09)	<0.00	<0.001	<0.001
Control group	5.61±1.24 (5.20-6.03)	4.76±1.22 (4.35-5.18)	4.64±1.08 (4.27-5.03)			
T, P	*P*=0.48	*P*<0.001	*P*<0.001			

T: Independent samples *t*-test, ANOVA: Analysis of variance, RM ANOVA=Repeated measures ANOVA, SD: Standard deviation, CI: Confidence interval

Table 3: Comparison of the mean of back pain disability score by the Quebec Back Pain Disability Scale before, immediately after the last session, and 4 weeks after the study in the two groups

Variables	Mean±SD (95% CI)			RM ANOVA, *P*		
	Before the intervention	At the end of the intervention	4 weeks after the intervention	Time	Time×group	Group
Intervention group	59.53±15.43 (54.31-64.45)	46.32±12.76 (41.92-50.41)	46.56±12.87 (42.09-50.56)	<0.00	<0.001	<0.001
Control group	61.21±13.930 (56.36-65.88)	56.94±14.01 (52.10-61.76)	57.36±13.870 (52.62-62.03)			
T, P	*P*=0.61	*P*<0.001	*P*<0.001			

T=Independent samples *t*-test, ANOVA: Analysis of variance, RM ANOVA=Repeated measures ANOVA, SD: Standard deviation, CI: Confidence interval

exercises, whereas no significant difference was observed in the control group. In intergroup comparison, their results did not show a significant difference between the two groups of massage therapy and water-based exercises.[22] This study has not investigated the effectiveness of the combined intervention of massage and exercise.

Massage is administered for the purpose of producing effects on the nervous and muscular systems, as well as the effects on the local and general circulation of the blood and lymph.[16] Massage therapy improves muscle function by increasing blood flow, reducing stress hormones, and increasing endorphin levels; improves the lymphatic circulation system; optimizes oxygen delivery to the tissues; releases tissue adhesions; and regulates muscle.[14]

One of the strengths of the present study is the method of sampling which increases the generalizability of the results. Moreover, all exercises and massages have been performed under the supervision of an expert physiotherapist and the attrition rate was low. However, a study with a larger sample size and longer periods of intervention may lead to different results. In addition, the patients were not blinded and this can be considered another limitation of the study.

Conclusion

According to the results of this study, the Swedish massage combined with exercise therapy could be more effective for reducing LBP and back pain disability compared to exercise therapy alone. Because Swedish massage is safe and easy for therapists to teach to patients, so they can use it at home, we suggest that it is a good NSLBP home treatment choice. Further studies are needed to reach more evidence.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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