



The Effect of a Rehabilitation Exercise Program Using Reflexology Massage on Lower Back Pain

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Abstract

Study Purpose. Therapeutic exercise is identified as one of the main rehabilitative approaches that returns the body to its original state, normal, functional and physiological equilibrium and minimizes pain. As a modern scientific field Reflexology by restorative analytic sessions in the pain conditions such as the back pain. massage has proven itself both in health and clinical treatment for corresponding body parts reflex and also has showed effectiveness Hence, the purpose of the current study was to improve lumbar spine rehabilitation as well as the reduction of lower back pain by sampling a number of women aged 50–60 years from Al-Salam Center for Therapy and Rehabilitation. The participants were examined with pre-test for both groups, after the six-weeks rehabilitation program performed, consisted of therapeutic exercises and reflexology massage. Post-test evaluations were conducted at the end of the program to assess the effects of the intervention.

Materials and Methods. The research method was experimental in design and a single-group pre-test/post-test. The research consisted of a muscular strength test conducted with a force sensor, the Kinova software in the analysis of the ROM angles, and a pain assessment form used in the evaluation of the pain felt by the participants. A purposive sampling method was used in the selection of six female participants aged 50-60 years from the total eight. The data collection was analyzed in the Statistical Package for the Social Sciences (SPSS) in a comparison of the pre-test and post-test.

Results. The findings showed statistically significant differences in pre- and post-tests across the measured variables. These findings indicate a significant enhancement in the strength of the spinal muscles, an increase in range of motion (ROM), and a reduction in lower back pain among the participants.

Conclusions. Results show that the implemented rehabilitation program helps to increase spinal muscle strength, flexibility, and pain intensity in patients with low back pain.

Keywords: Rehabilitative Exercises, Reflexology Massage, Lower Back Pain, Lumbar Spine.

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Introduction

Rehabilitation is described as the systematic and scientific nature-based application of precisely tailored methods and tools to treat and improve structural and functional deficits that occur as a result of injury, disease, or disability. Among these, therapeutic exercise is considered one of the most effective rehabilitation modalities when applied systematically and precisely, in alignment with the specific functional disorder of the body. This approach is grounded in the principles and laws of human movement and is employed to design therapeutic systems aimed at restoring and renewing motor functions, ultimately enabling the body to regain its pre-injury or pre-illness state (Cho et al., 2015). It can be applied across all age groups and for various types of injuries and bodily tissues. Accordingly, muscle strengthening and achieving the joint's full range of motion represent the foundation of therapeutic exercise. Preventive programs are then implemented based on the type of injury. (Al-Nouri, 2016)

In recent years, physiotherapy has witnessed significant advancement and diversification in the techniques and methods employed. This progress is largely attributed to the fact that physiotherapy carries no side effects and can be applied across all age groups and injury types. Moreover, it effectively shortens the time required to achieve optimal rehabilitation outcomes and facilitates patients' return to normal life (Parlak et al., 2024).

Therapeutic exercises are regarded as one of the essential rehabilitative methods for restoring the body to its natural state and achieving functional and physiological balance, as well as alleviating pain. Reflexology massage is considered a technique that positively influences the health of corresponding body parts by applying pressure to specific areas. Key reflex points located in the feet are connected to various organs and systems within the body. Reflex therapy techniques stimulate these points, thereby sending waves of relaxation throughout the entire body (Eghbali et al., 2012).

Reflexology experts believe that weakness in the reflex zones located on the soles of the feet is directly linked to corresponding parts of the body through the nervous system, thereby helping those areas perform their functions more effectively. This connection helps the corresponding body areas perform their functions more effectively when the reflex zones are stimulated. The sensory organs in the feet are connected to the brain and internal organs, which explains the effectiveness of applying pressure to these points in enhancing overall health (Mohan et al., 2023).

The importance of this study stems from the ability of these therapeutic approaches to provide a natural and effective method of treatment with substantial benefits in alleviating pain and achieving positive outcomes within a limited number of sessions. Therefore, the researchers were motivated to investigate this issue, as it represents one of the pressing health concerns of the modern era.

The investigators then noted that low back pain is one of the most common health problems and reduces work ability and quality of life among people. They also noticed that thousands of patients were using unproven traditional cures, which led to the need for safer and more efficacious approaches. Chronic lower back pain disability is the principal topic addressed in this research, as its increasing incidence worldwide still limits activities of daily living, work productivity, and quality of life. The problem is exacerbated by the widespread use of scientifically unsupported but ostensibly appealing unregulated interventions and treatments (Medeiros et al., 2018).

Recent research has introduced a new therapeutic approach in rehabilitation science based on reflexology massage. It works by gently pressing into reflex points in the feet that connect neurologically to systems and organs throughout the body and is considered to be safe and effective. By stimulating such points, physiological responses may be enhanced and potentially aid in functional improvement. Reflexology, with an innovative approach and established safety, has gained research interest in exploring its inherent mechanism and impact on lumbar rehabilitation and pain relief (Ilbeigi et al., 2015).

Accordingly, the present study aimed to achieve the following objectives:

- To design a set of rehabilitative exercises and incorporate reflexology massage techniques.
- To examine the effect of rehabilitative exercises and reflexology massage on the treatment of lower back pain.

To verify the objectives of the study, the following hypothesis was formulated:

- There are statistically significant differences between the pre-test and post-test measurements in the research variables among the study sample.

The scope of the study was defined as follows:

1. **Human scope:** A sample of female participants suffering from chronic lower back pain, aged between 50 and 60 years.
2. **Temporal scope:** From July 3, 2024, to September 3, 2024.
3. **Spatial scope:** Al-Salam Center for Treatment and Rehabilitation, Baghdad.

To verify the research hypothesis and accurately determine the effect of the prescribed exercises, it was necessary to select a scientific method appropriate to the nature of the problem. Accordingly, the researchers employed the one-group experimental design, as it was suitable for addressing the research problem and is commonly applied in solving problems through systematic scientific and empirical procedures (Yassin et al., 2016). The originality of this study lies in the application of reflexology massage, introduced here for the first time to a sample of women suffering from lower back pain in a rehabilitation center in Baghdad.

Materials and methods

Study participants

The research sample was chosen by purposive sampling that intentionally goes out of their way to meet candidates who fulfill the study inclusion criteria and accurately reflect on the target population (Obidat et al., 2014) Study Sample: The study sample include female patients who diagnosed with chronic lower back pain and registered in Al-Salam center for therapy and rehabilitation. Selection was based on extensive medical record review and a specialist physician confirmation of diagnosis. Of them, six met defined clinical criteria, and this was validated using reports from diagnostic medical reports (Hayden et al., 2021).

After clinical diagnoses and additional examinations including MRI scans, the selected participants entered a rehabilitation program overseen by a specialist physician, which was designed by the research team. The intervention consisted of exercise therapy with additional reflexology massage of the foot, applied at specific reflex zones (Abdul-Razzaq & Munahi, 2019).

Great effort was made to ensure that the characteristics of the participants were identical prior to starting the program — in regard to age, the body weight, and height. To achieve this, it was necessary to maintain some consistency across the sampling of the spine in enabled the alignment with the biomechanical and structural properties of the lumbar Spine due to differences such as spinal curvature features like lordosis or other spinal issues, such as abnormalities.(Tobert et al., 2020).

Table 1. Demonstrates the sample's homogeneity across variables of age, weight, height, injury severity, and duration of injury.

No.	Variable	Unit of Measurement	Mean	SD	Median	Skewness Coefficient
1	Age	Years	57,383	13,22	57	0,0041
2	Height	cm	162,76	32,81	163	0,0022
3	Body Mass	kg	74,851	11,66	75	0,0021
4	Injury Severity	Moderate Degree				
5	Injury Duration	month	4,665	1,21	5	0,0038

Table 1 demonstrates the statistical consistency of the research sample across the variables of age, height, body mass, and duration of injury. The values of the skewness coefficient were close to zero, indicating that the data were normally distributed. Moreover, the proximity between the mean and the median reflects a balanced and symmetrical distribution within the sample.

Study organization

The researchers employed the experimental method. After conducting several visits to multiple physiotherapy centers in Baghdad, the Al-Salam Center for Therapy and Rehabilitation was deliberately selected, as it contained the required sample that met the study criteria in terms of chronological age, type of injury, and its severity. The research population initially consisted of eight women diagnosed with lower back pain. After approximately one week of gathering them and explaining the objectives of the study, two participants were excluded, resulting in a final sample of six women aged 50–60 years. These participants were purposively selected from Al-Salam Center for Treatment and Rehabilitation. Their condition was confirmed through magnetic resonance imaging (MRI) and a clinical examination conducted by a specialist physician. The rehabilitation program which included therapeutic exercises and reflexology massage, was implemented three sessions per week over a six-week period. Pre- and post-intervention assessments were carried out to measure muscular strength, spinal flexibility, and pain intensity. The data were analyzed statistically using the SPSS software package.

Research Instrument

- Force sensor device for measuring muscular strength.
- Medical scale for recording body weight.
- Data recording form for systematic documentation.
- Measuring tape for assessing anthropometric variables.
- Arabic and international scientific references relevant to the study.
- Expert consultants for program validation and supervision.
- Kinovea device for assessing range of motion.
- Pain assessment form for documenting pain levels.

Tests Used in the Research

- Muscular strength assessment using the force sensor device (EX 3–200).
- Evaluation of the strength of spinal-supporting muscles from two positions:
 - Forward flexion.
 - Backward extension.
- Assessment of spinal flexibility from the following positions:
 - Forward spinal flexion.

B. Backward spinal extension.

C. Lateral spinal flexibility to the right and left sides.

Spinal flexibility and range of motion were measured using the Kinovea software, in which images of the target positions were uploaded and analyzed to identify the defined angles and determine the maximum extent the participant could achieve in each of the aforementioned positions.

4. Pain Assessment Using the Visual Analogue Scale ([Salik Sengul et al., 2021](#))

This scale has been widely adopted in both Arab and international contexts for assessing pain levels. It consists of a sheet divided into ten numbered boxes (1 to 10), arranged from left to right. The participant is instructed to indicate the level of pain they experience while performing a movement involving the affected area in a specified position. A duration of three (3) seconds is allocated for each box. Pain intensity is assessed based on the following positions:

A. Forward flexion.

B. Backward extension.

Pilot Study

The pilot study is considered a preliminary trial that closely simulates the main experimental procedure ([Maaboub, 2011](#)). The researchers conducted the pilot study on July 4, 2024, using a sample of two participants who were not excluded from the main experiment. The objectives of the pilot study were as follows:

- To verify the procedures and execution of the tests.
- To address any errors or challenges observed during test administration.
- To standardize the performance of exercises, regulate rest periods, and adjust the difficulty level of the rehabilitative exercises.

Pre-Tests

The pre-tests were administered on Monday, July 8, 2024, at 10:00 a.m. in Al-Salam Center for Rehabilitation, involving the selected sample.

The Designed Rehabilitation Program

The researchers presented the rehabilitation program to a panel of subject-matter experts in order to select the exercises most appropriate to the program's objectives, which were:

- To maintain and enhance flexibility.
- To restore or improve muscular strength.
- To manage and reduce pain.
- To prevent recurrence of injury in the same area.

The program officially commenced on Wednesday, July 9, 2024, and was conducted in the physiotherapy unit at the Al-Salam Centre for Treatment and Rehabilitation. Its structure was as follows:

- The program was implemented over a duration of six weeks, comprising three rehabilitation sessions per week, totalling 18 sessions.
- Each session lasted between 20 and 60 minutes.
- Therapeutic exercise duration ranged from 15 to 20 minutes.
- Reflexology massage was administered for approximately 3 to 4 minutes following each session.

Expert Panel

- Prof. Dr. Suad Abdul-Hussein
- Prof. Dr. Walaa Fadel
- Prof. Dr. Ali Badawi

- Asst. Prof. Dr. Lamia Abdul-Sattar

The researchers adhered to the principle of progressive loading during the implementation of the rehabilitation program. This was achieved by gradually increasing exercise repetitions, performance time, and rest intervals throughout the six-week period. The progression in exercise intensity was designed to promote recovery and ultimately restore natural, pain-free spinal mobility.

Reflexology massage was administered following the completion of the rehabilitative exercises, using either a specialized massage oil or therapeutic powder.

Post-Tests

After completing all the correctional therapy, the post-tests were conducted on Thursday, August 22, 2024, at 10:00 a.m. in the Physiotherapy and Rehabilitation Hall of the Al-Salam Center for Rehabilitation in Baghdad, for the study sample. To ensure procedural consistency and the reliability of the collected data, the testing conditions were closely matched with those of the pre-test phase.

Statistical analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS), and the statistical results obtained were directly related to the objectives of the study.

Results

This study aimed to assess the efficacy of a combined muscle-strengthening program of therapeutic exercises and reflexology massage in increasing spinal flexibility and reducing lower back pain. Statistically significant differences were observed between the pre- and post-test measures, with post-test results being more favorable. These findings confirm the hypothesis that the rehabilitation program positively influenced the physical and sensory parameters of the patients.

Table 2. Presents the means, standard deviations, calculated *t*-values, and significance levels for the strength tests conducted on the research sample.

No.	Tests	Unit of Measurement	Pre-Test		Post-Test		Calculate d <i>t</i> -value	Significance Level	Statistical Significance
			Mean	SD	Mean	SD			
1	Forward Flexion	Sec.	5	1,029	8	1,30	5,918	0,002	Significant
2	Backward Extension	Sec.	6	1,021	10	1,33	5,635	0,004	significant

Statistical differences between the pre-test values and the post-test values were found in the variables of the forward flexion and backward extension, as presented in Table 2, The post-test scores indicate that the rehabilitation program was effective in improving spinal muscular strength amongst the participants in the study sample

Table 3. Presents the means, standard deviations, calculated *t*-values, and significance levels for the spinal flexibility and pain assessment tests.

No	Tests	Unit of Measurement	Pre-Test		Post-Test		Calculate d <i>t</i> -value	Significance Level	Statistical Significance
			Mean	SD	Mean	SD			
1	Trunk Forward Flexion	Degree	95,17	13,81	84,22	10,92	7,013	0,008	Significant
2	Trunk Backward Extension	Degree	41,76	7,72	35,53	6,81	4,760	0,008	significant

3	Trunk Right Lateral Flexion	Degree	43,82	5,26	34,16	6,03	4,880	0,005	Significant
4	Trunk Left Lateral Flexion	Degree	45,63	5,33	38,37	6,12	5,56	0,003	Significant
5	Pain Assessment	Degree	3,2	0,81	8,6	1,36	5,91	0,001	Significant

Table 3 shows statistically significant differences between the pre-test and post-test results in spinal flexibility and pain assessment. The improvements observed after the intervention highlight the role of the rehabilitation program in promoting flexibility and lowering pain intensity.

Discussion

The standard deviations, t-values, and significance levels for the strength, flexibility, and pain assessment tests are presented in tables 2 and 3 for the research sample. All these comparisons between pre- and post-test measures yielded statistically significant differences. According to the researchers, these larger differences can be attributed to the well-structured rehabilitation program provided to participants in this study. The authors designed this program which consists of specific therapeutic exercises that might be responsible for most of variables improvement measured. Also, through the reflexology massage, the neuromuscular tensions in different areas of the organism, especially in the low comebacker are diminished ([Gligor & Istrate, 2013](#)).

[Suliarno et al. \(2024\)](#) The findings showed that reflexology massage may help reduce neural tension, allowing the nerves, especially around the lower back area, to remain more in a transverse position. This, in turn, adjusted the angles of movement to enable these nerves to function more effectively in left-right and anterior-posterior movements. Such adaptations lead to spinal plasticity through increased neural excitability and enhanced conduction velocity of nerve impulses, which consequently improves the performance of the neuromuscular system. [Sami \(2020\)](#) supported this result by describing how the muscles and nerves become better prepared to respond to movements and positions considered appropriate by the body, thus reinforcing the functional gain.

Similarly, [Kapikiran and Özkan \(2021\)](#) reported that reflexology massage triggered the release of endorphins, which play a critical role in modulating autonomic nervous system responses by enhancing blood circulation. This physiological adaptation was clearly reflected in the reduction of pain among the study sample.

According to the study findings, when the lower back muscles were exposed to this type of treatment, sensory nerve activity increased at the skin level and large-diameter nerve fibers were stimulated. This process releases endorphins ([Kandemir et al., 2020](#)), which are the body's natural painkillers. Reflexology massage may also help with certain chronic diseases by inducing specific reflex responses through reflex points on the surface of the body. This therapeutic approach has been found to reduce both acute and chronic pain conditions within a short period of time ([Batota, 2016](#)).

The rehabilitation program, combined with the application of reflexology massage, contributed to enhanced development in bilateral angular movement. This improvement was reflected in increased muscular performance, achieved through the recruitment of a greater number of motor units—an outcome directly related to the efficiency of the nervous system. In essence, the program facilitated the activation of a larger pool of motor units during physical effort ([Al-Bashtawi & Ismail, 2016](#)).

Conclusions

The therapeutic exercises and the use of reflexology massage contributed to improving the strength of the muscles acting on the spine. The structured rehabilitation program applied to the research sample played an effective role in enhancing spinal range of motion in anterior, posterior, and lateral directions. The impact of the rehabilitation approach was also positive in alleviating lower back pain among the participants.

It is recommended to recognize the importance of using modern techniques in medical treatment and to give priority to reflexology massage for the rehabilitation of various injuries. There is a need to emphasize, through media channels, the significance of motor rehabilitation in general and reflexology massage in particular. Furthermore, collaboration between therapists in medical rehabilitation centers and graduates of physical education faculties specialized in rehabilitation should be encouraged to foster mutual expertise and benefit. In addition, the researchers recommend that future studies be conducted with larger sample sizes encompassing more diverse age groups, in order to obtain results that are both more accurate and generalizable.

Conflict of interest

The author declares that they have no conflicts of interest that could influence the outcome of this study.

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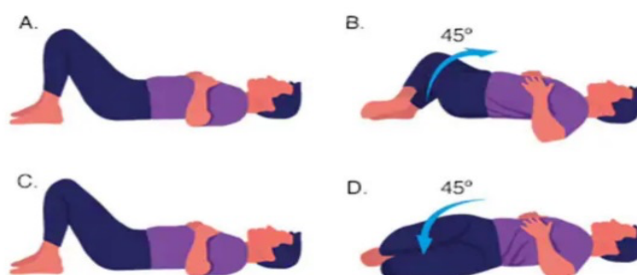
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Appendix 1. Rehabilitation Exercise

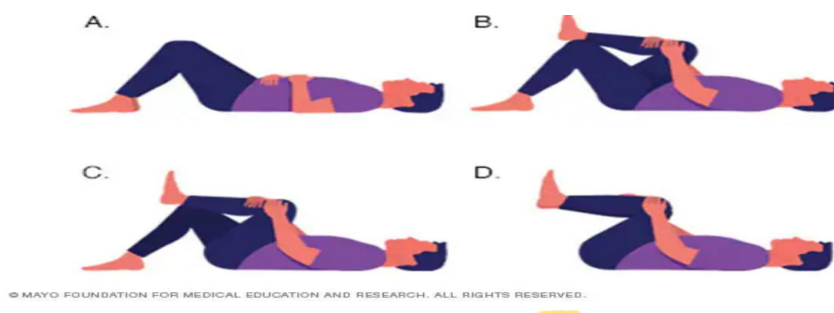
1. *From a supine position, raise one knee toward the chest.*



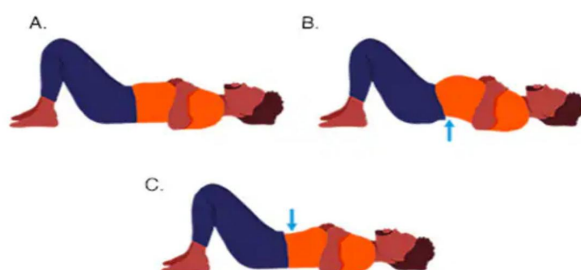
2. *From a full supine position, gently rotate the knees to the right and left sides at approximately a 45° angle.*



3. *From a supine position, raise one knee toward the chest while keeping the opposite leg extended on the floor, then alternate with the other leg.*



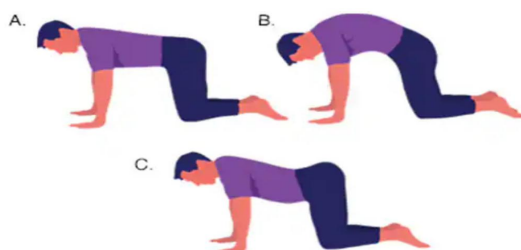
4. *From a supine position on the floor, elevate the lower back gently upward, then return to the starting position.*



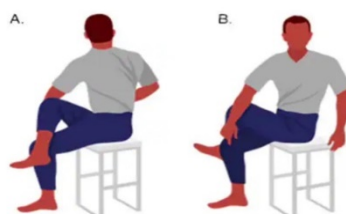
5. From a supine position on the floor, lift the hips by bending the knees to form a straight line from the knees to the shoulders.



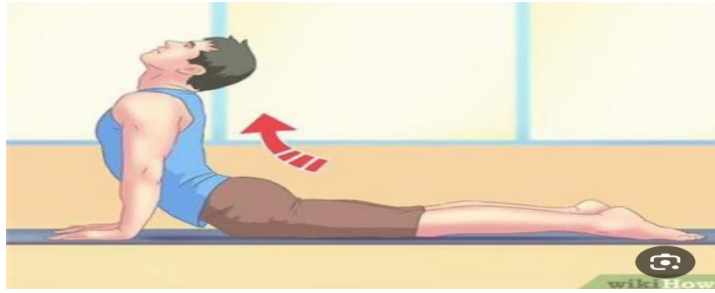
6. While positioned on hands and knees, slowly arch the back upward as if drawing the abdomen toward the ceiling while tucking the head downward. Then, gently relax the back and abdomen downward toward the floor.



7. While seated on a backless chair, cross the right leg over the left. Place the left elbow against the outer side of the right knee, then rotate the upper body in a controlled manner toward the right side. Repeat the exercise on the opposite side.



8. From a prone position, elevate the upper trunk by pressing through the palms.



9. From a prone position, simultaneously lift both arms and legs off the ground.



Appendix 2. Application of Reflexology Massage

