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ORIGINAL ARTICLE

The Effectiveness of a Rehabilitative Program on the Cervical and Lumbar Pain Relief for Rural Women

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ABSTRACT

Background. The multiplicity and diversity of daily life physical activities may have harmful effects on body health. The cervical and lumbar regions of the body are more vulnerable to functional problems resulting from the daily lifestyle and activities. **Objectives.** The present study aims to develop a special program of therapeutic rehabilitation exercises which can relieve the cervical and lumbar pain in rural women. **Methods.** The study subjects are middle-aged adult females living in rural communities. 50 females were intentionally selected, and they all suffered functional problems in the cervical and lumbar regions. The female subjects fall within the age group of (38-47 / 42.08 years, ± 1.55). They were divided into two groups: control (19) and experimental (31). **Results.** The homogeneity of height, weight, and BMI is performed. Strength and elasticity tests for experimental group are performed to investigate the physical conditions of the muscles in cervical and lumbar regions before and after completing the program, and to determine the effectiveness of the program. The study reveals significant differences in the strength and elasticity test results. In addition, the study shows significant differences in the neck and back pain scale in favor of the post-test. However, no significant correlation between weight loss and pain scale is detected. **Conclusion.** The study recommends that Low-income rural women developing neck and lower back pain who cannot afford to seek a physician's consultancy or join rehabilitation centers can benefit from rehabilitation programs and exercises via a low-cost brochure to improve their functional capability.

KEYWORDS: ***BMI, Neck Pain, Back Pain, Rehabilitation.***

INTRODUCTION

With no exception, all human beings are entitled to public health programs and services which maintain lifetime general health well-being and promote healthy lifestyles. Many countries around the globe have taken the responsibility for initiating such programs and providing health services. The governments around the world should shoulder the task of making such programs and services available to all the categories of their peoples at reasonable or no prices as human health must come at the top of their priorities. The current lifestyle and the lack of health and safety awareness have had serious consequences for the health of the poorly educated family members. The routine activities these people do every day at their houses or jobs may have harmful effects upon their health.

The spine, as a very important part of the human body, enjoys a recognizable specificity in the anatomical composition and the functional capabilities of the human body. In fact, the presence of the spinal cord represents the peripheral nervous system from which the spinal nerves branch to different areas of the body according to their anatomical locations and functions. The cervical and lumbar areas move

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more freely than the rest of the areas in the spine. Thus, the flexibility of movement of these areas makes them more vulnerable to functional problems than the rest of the areas. Consequently, the daily life activities and job practices and requirements may result in certain damages in these two areas of the spine and increase the burden on those functional areas. Cervical and lumbar regions are important movement hubs that provide essential support for the implementation of the tasks assigned to the body. Numerous medical and health institutes all over the world have done a considerable amount of research and studies on the spine pain, including the US medical institutes. The increasing interest in this kind of investigation is due to the drastic escalation in the number of cases suffering from pain in the lower back (one hundred million cases in the USA).

These physical disorders have had profound effects on the careers and jobs of so many people who may have lost their jobs or careers due to such disorders. In fact, this type of disorders is the second-largest and most common Neurological disease disorder after headache. A study estimates that the percentage of people with low back pain is approximately (38%) around the world (1). According to the reports of the World Health Organization, Low back pain affects 60% to 70% of adults at some point in their lives (2). Lower back disorders and back injuries usually occur to (30-60) year old workers in 2 to 4 percent increase of the working population annually (3). 80% of the working population is likely to experience a seizure of lower back pain. Back injuries are reported to have been the main cause for the absence from work (4).

A relevant study also indicates that the pain of the cervical area is most prevalent among middle ages and that the percentage of infected females substantially exceeds that of infected males. The study confirms that cervical and lumbar spine disorders negatively affect the daily life activities by (11.5%), social activities by (2.4%), and the ability to continue work by (1.7%) (1.7%) (5).

The significant scientific contribution of the current study lies in its focus on rural women as they are more exposed to the pressures of the traditional daily life activities and social requirements in the Iraqi society. The main concern of the study is to investigate the pain that rural women suffer especially in the areas of the cervical vertebrae and lumbar as a result of the occupational stress and daily life activities. The study targets local females working on farms for 6-8 hours who cannot afford the cost of medical treatment and expensive physiotherapy sessions. The present research paper tries to provide home-based therapeutic exercises that can be done during rest time. It investigates the potentials of a rehabilitation and therapeutic program to reduce or relieve cervical vertebrae and lumbar pains and improve the function of the cervical and lower back regions. Nevertheless, the critical question in this situation do rehabilitation, therapeutic exercises have an effect on relieving pains of the cervical and lower back effectively and dispense with visiting physiotherapy centers?

MATERIALS AND METHODS

Subjects. The participant community in the present research consists of (291) rural women from Hamdaniya District, northeast of the northern Iraqi province of Nineveh. The participants practice daily farm works with relatively undeveloped agricultural equipment and farm machinery, which, in turn, forces them to experience difficult and stressful conditions for several hours. These stressful conditions cause functional problems in the cervical and lumbar regions of the spine for those women.

The research (38-47) year old female subjects are intentionally and carefully chosen. 50 women with problems and disorders in the cervical (Muscle Pain, Facet Joint Pain) and lumbar regions of the spine (Flexion Dominant back pain) are selected.The subjects are divided into two groups: control (19) and experimental (31). They have given their full consent to be part of the treatment program. They represent (11%) of the research community (Figure 1). The subjects are diagnosed by a physician to suffer functional problems in the cervical and lumbar regions of the spine.

The homogeneity for Experimental group subjects of height (mean 155.35, Std 5.7), weight (mean 76.91, Std 8.59), and BMI (mean 31.93, Std 3.78) is processed. It is also processed for the control group of height (mean 156, Std 4.54), weight (mean 76.75, Std 8.29), and BMI (mean 31.65, Std 3.7).

Anthropometric Measurements. Anthropometric measurements of the subjects (length, mass, and BMI) were in the fitness hall of Al- Hamdaniya Sports Club. The length and mass measurements of the subjects were first taken at the same time

using the height and weight measuring device (M-110, UK). The height and weight measurements are used to extract the BMI, which expresses the relationship between a person's weight and height. The BMI is calculated by dividing the weight in kilograms by the square of height in meters as follows: BMI = weight in kg/ height in m^2 (6).

Physical Variables Testing. To obtain the results of the current research tests, MicroFET2, the digital dynamometer Handheld Muscle Tester (HOGGAN, Salt Lake, Utah, USA), is used. At the beginning of testing, the examiner puts each subject in a certain position to isolate and contract the muscle of interest with the device in the proper position. The examiner gets into the "power position", a stable position that provides the examiner with the maximum ability to resist the force applied by the subject. The examiner instructs the subject to use force against the device, while the examiner resists. The object of the test is to make the subject exert the maximum force using only the muscles being tested. Tests typically run for seconds (slow count of 4). The test starts with "Go" and ends with "Relax" (7).

Test the Strength of the Extensor Muscles of the Head (TSEH). From a chair-sitting position, the subject's back is fully attached to the chair by a tape strip from the chest area, the head is perpendicular to the trunk and the hands hang from both sides of the body. The digital dynamometer is put on the back of the head. A position is taken by the examiner to resist the movement of the subject. The examiner asks the subject to extend her head with the maximum possible force to the back, maintains the stability of the movement for 4-5 seconds and finally records the readings on the device in kilograms (7). The test takes place before and after the training program

Test the Strength of the Flexor Muscles of the Head (TSFH). With only one exception, the aforementioned procedures are adopted in this test. The examiner in this test resists the forward head movement of the subject. The reading on the device is recorded after holding the position for 4-5 seconds. This test takes place before and after the start of the training program.

Test of the Strength Lower Back Muscles to Extend the Trunk (TSLBET). A subject is seated on a chair without a backrest and arms outstretched on both sides of the body. The trunk slightly bends forward, achieving an internal angle of approximately (65°) between the trunk and thighs. This angle is chosen based on many observations of the positions the subjects assume during their daily life activities and farm works. The examiner puts the device on the upper back area between the shoulder blades of the subject and then maintains appropriate position well in order to achieve excellent stability to resist the movement of the extending trunk. A subject is instructed to push the trunk back and hold it for 4-5 seconds. The device reading is then recorded in kilograms. This test is done before starting the program and after completing it (8).

Test Bending the Trunk Forward from Extended Sitting (TBTFE). The goal of the test is to measure the elasticity of the back in forwarding bending movements. The subject sits tall with the back straight and the hands straight on the side touching the floor and trying to extend the arms straight forward. The subject tries to bend the trunk forward to reach the maximum point of bending as much as possible. Moreover, the test is performed without stiffness in the muscles of the arms, trunk, neck, and knees. The subject bends the trunk forward slowly and tries to achieve the maximum possible amount of bending.

The subject is given two or more trials as a warm-up before the test. The subject must maintain the final status in approximately (2-3) seconds. The distance between the beginning of the two legs and the limit that the subject can reach with fingertips is measured. The best results of the three trials are recorded. The test procedure is carried out before and after the training program.

Test Trunk Elasticity Forwards from the Prone Position (TTEF). The aim of this test is to measure the flexibility of the trunk. The test subject lies flat, extends legs completely with fixation and fixes the hip with the help of a colleague. The subject extends the trunk backwards as much as possible, and the distance from the ground level to the bottom of the chin is calculated in centimeters to indicate flexibility (9). The test procedure is done before and after the training program.

Pain Scale. Neck Pain and Disability Scale**.** To measure the neck pain levels, researchers use the Neck Pain and Disability Scale (NPAD) of Wheeler et al., as a reliable and trustworthy questionnaire. The questionnaire consists of 20

questions with a score of zero (no pain) to five (most severe pain) for each. The subjects are interviewed separately to fill out the questionnaire (10, 11). The previous procedures taken again after the end of the training program.

Back Pain Scale. To measure the lower back pain levels, the Aberdeen Back Pain Scale Questionnaire is used. It is "one of the most rigorously tested measures for back pain related health status, but it is only suitable for the lower back". The questionnaire consists of 19 questions (12, 13). The subjects are interviewed separately to fill out the questionnaire. The previous procedures are taken again after the end of the training program.

Training Program. The goal of the present study is to propose a program to relieve the pain in the cervical and lumber areas and improve general physical mobility. To achieve this aim, the suggested training program for the experimental group is designed to include several physical and therapeutic exercises. It is prepared according to the principles of training and based on the foundations of the rehabilitative treatment exercises to suit the general health status of the test subjects and their ages. The program includes 48 rehabilitation therapeutic training times distributed into 3 times per week for four months. The units are presented with the applied practical explanation by one of the researchers and distributed to the subjects to enable them to perform. The exercises and procedures are carried out in a precise scientific manner throughout the study stages including the primary selection processes, the type of injury, the age and sex of the subject. The gradual intensity of the program depends on the exercises and repetitions of each exercise in order to preserve the general health of the subjects from any complications that may result from committing any mistake. The therapeutic training unit time ranges from 40 to 45 minutes. The researchers plan the qualification training unit to include a general warm-up. The warming-up exercises include brisk walking, jogging, jogging between exercises, relaxation and stretching exercises that are introduced into the program as a positive rest.

Exercises. Several exercises are adopted to engage the muscles that affect the cervical and lumbar areas.

Neck exercise: This exercises include cervical flexion, retraction exercise, neck rolls, deep neck flexor, shoulder rolls, cervical extension, cervical side flexion – right, cervical rotation- left, forward bending in standing, neck flexion in the supine position, pro/retraction, lateral flexion, extension cervicothoracic junction, Nod movement on the wall, upper cervical spine, flexion/extension full range and bilateral shoulder elevation (14-16).

Back exercises: The exercises involve hugging knees to chest, legs stretching, half push-ups, knee rolls, arching and hollowing, cat and camel, pelvic tilts, pa

rtial curl, quadruped arm/leg raising, side plank, gluteal stretching, extension exercise, thoracic stretching, thoracic extension, head-arms and trunk rotation, trunk rotating and knee raising (17-19).

Statistical Analysis. For the statistical processing of data, the researchers in this study use the statistical package SPSS 18.0 for all analyses (SPSS Inc., Chicago, IL, USA). The mean Std. Deviation and Skewness for the homogeneity of the intended subjects are also used. For the pre and post-tests, the statistical Paired T-test is used to find the differences between the pre and post-test. Besides, the Pearson correlation coefficient is used to find the correlation between the weight and pain scale.

RESULTS

The previously mentioned tests were repeated after the end of the training program. Table 1 indicates that there are significant differences between the pre and post-tests. The results of the tests for the cervical region are as follows: The strength of the head extensor muscles before the workout was 7.27 kg and after training, the muscle strength reached 9.80 kg. this was significant (P= 0.001). The same variance of the strength to the head flexor muscles, before the workout 12.53kg, and after training, the muscle strength reached 14.79 kg (P=0.001) is also significant.

Table 1 also shows the significant results of the back region tests in which the result is significant for the test of the strength of the lower back muscles to extend the trunk when was 19.87 kg before training program, and after training reached 22.30kg (p=0.001). In the test of bending the trunk forward from extended sitting it was 1.87 cm in pre-test, and after training program reached 8.90cm (p=0.002). This is Followed by a test of trunk elasticity forwards from the prone position in which its pre-test was 31.25cm and the post-test result was 35.35cm, which is also significant (p=0.001).

Table 2 indicates that there are significant differences in weight (p=0.001). This result comes after comparing the weight results of the subjects before and after the training program.

According to the reports by the World Health Organization in the study of obesity in the Middle East, if the BMI exceeds 25, a person is considered overweight. The reports also state that if the BMI is near to 30 or more, a person is considered obese (20). Therefore, the researchers took all subjects into consideration because they all exceeded 25 (mean 31.93). Table 2 shows significant differences in BMI between the results of the pre- and post-training program (p=0.000).

Table 3 shows the statistical results of the pain scale (Neck Pain Scale and Back Pain Scale) before and after the training program - by paired sample t-test. The results of the experimental group are significant in the neck Pain Scale (p=0.000) in favor of the post-test, and the results are significant in the back pain scale (p=0.000) in favor of the post-test. For the control group, there are no significant results between pre and post-tests in the neck pain scale (p=0.287). Also, there are no significant results between the pre and post-tests in the back pain scale (p=0.558).

Table 4 shows the correlation between the body weight and pain scale (Neck Pain Scale and Back Pain Scale) for the experimental group. The obtained result reveals that there is no significant correlation between the weight and Neck Pain Scale (P= 0. 264), and there is no significant correlation between the weight and Back Pain Scale (p=0.861).

Table 1. Statistics Results for All Testes after and before Training Program - by Paired Samples Test

Variables	Paired Differences					
	Mean	Std. Deviation	Std. Error Mean	T	Df	Sig. (2-Tailed)
TSFH	2.529	1.584	0.284	8.88	30	0.000*
TSEH	2.260	1.236	0.222	10.18	30	0.000*
TSLBET	4.096	1.422	0.255	16.03	30	0.000*
TBTFE	8.032	4.607	0.827	9.70	30	0.000*
TTEF	2.429	1.052	0.189	12.84	30	0.000*

TSFH- Test the strength of the flexor muscles of the head**; TSEH -** Test the strength of the extensor muscles of the head**; TSLBET -** Test of the strength lower back muscles to extend the trunk**; TBTFE -** Test bending the trunk forward from extended sitting**; TTEF -** Test trunk elasticity forwards from the prone position**. ***Significant at p < 0.05**.**

Table 2. Statistics Results for Weight and BMI before and after Training Program - by Paired Samples T-Test.

Variables	Mean		Mean Differences	Std. ±	T	Df	Sig. (2-tailed)
	Before	After					
Weight. kg	76.91	74.64	2.272	1.667	7.588	30	0.001*
BMI	31.93	31	0.967	0.666	7.947	30	0.000*

***** Significant at p < 0.05**.**

Table 3. Statistics results for Pain scale (Neck Pain Scale and Back Pain Scale) before and after training program - by paired samples t-test.

Experimental Group Variables	Mean	Std. ±	Std. Error Mean	T	df	Sig. (2-Tailed)
ABPS	1.584	1.483	0.266	5.948	30	0.000
NPAD	2.466	1.166	0.212	11.581	30	0.001
Control group variables						
ABPS	0.091	0.664	0.152	0.597	18	0.558
NPAD	0.263	1.045	0.239	1.096	18	0.287

ABPS- Aberdeen Back Pain Scale**; NPAD-** Neck Pain and Disability Scale**; *** Significant at p < 0.05**.**

Table 4. Correlation Statistics Results for Weight before and after the Training Program with Pain Scale (Neck Pain Scale and Back Pain Scale) by Correlation Coefficient Pearson.

Variables	Neck Pain Scale		Back Pain Scale	
	Before	after	Before	after
Weight before				
Pearson Correlation	0.076	0.145	0.006	-.011
Sig. (2-tailed)	0.686	0.435	0.974	.953
N	31	31	31	31
Weight after				
Pearson Correlation	0.127	0.207	-0.008	-0.033
Sig. (2-tailed)	0.495	0.264	0.965	0.861
N	31	31	31	31

***.** Correlation is significant at the 0.01 level (2-tailed)**.**

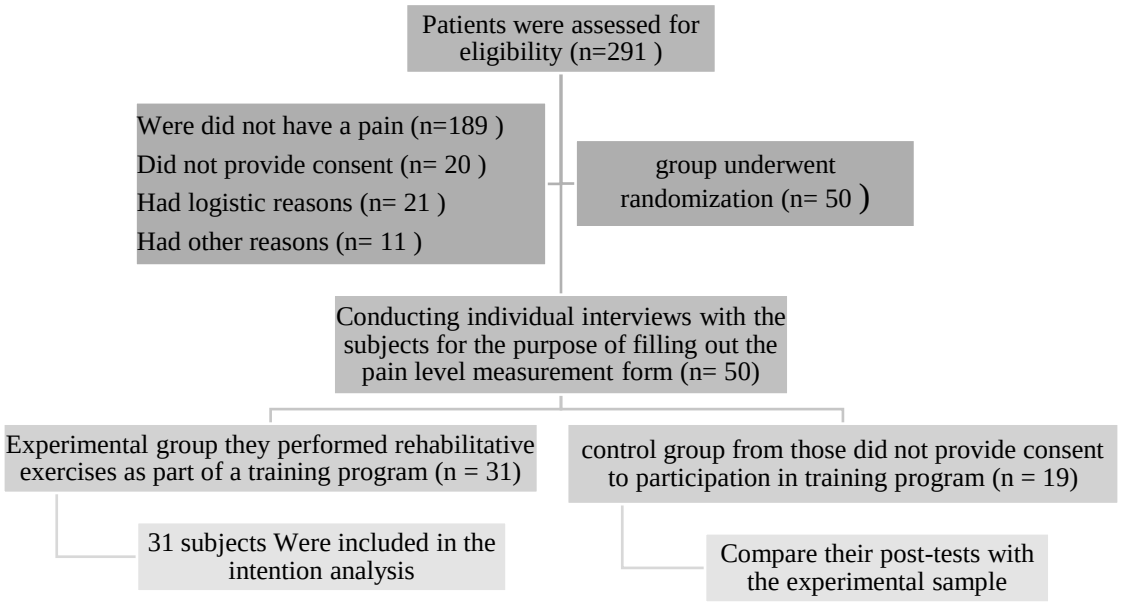

Figure 1. Diagram Showing the Sequential Procedures for Selecting Subjects and Experimental Procedures

DISCUSSION

The study aims to provide pain relieving methods for the rural women who do not have the financial resources and required equipment to relieve the cervical and lumbar pain. The study proves the effectiveness of the therapeutic exercises in the training program in relieving pain, improving physical movement and activity, and losing extra weight.

A number of research studies indicate that there is a relationship between the type of physical work and the pain caused by the cervical (21). In other studies, it is founded that fieldwork is one of the main causes of low back pain (22).

During their daily work, rural women generally follow similar routine of activities and practices in the fields. These activities and practices are almost constant, limited and unidirectional. They simply involve cultivating land, harvesting crops, fertilizing land, and seeding which require women to work for hours in stereotyped conditions. Such conditions consequently exert constant pressures on the spinal and neck areas. Ojoga et al. indicate that one of the factors that contribute to a large degree to the lower back pain is the occupational activities that include frequent and prolonged bending (23).

The current study demonstrates that the participants achieved significant improvement, and the researchers believe that the improvement came as a result of engaging muscles that were not effective in the routine field work of the subjects. Miyake et al, indicate that special exercises are likely to enhance the stability of the trunk to improve the function of the upper limb, and that these exercises can be adapted to patients (24).

Another study on the relationship between muscle activities and neck pain indicates that flexibility and special exercises play an important role in muscle recruitment and thus work to relieve neck pain (25).

Weight loss is not a priority to the current study. However, by reviewing relevant studies, articles and rehabilitation references, the study researchers note that weight factor is closely related to the pains in the neck and lower back (26). However, despite the significant loss in weight, the results also show that there is no significant correlation between weight and pains. The researchers believe that the percentage of weight loss is not enough and the subjects remain within the obesity limits. This is confirmed by the mean of the BMI after the training program (30.67) which, despite its significant decrease, remains higher than normal limits. The study researchers also believe that the exercising program is effective in enhancing the stability of the spine, increasing the trunk muscles strength and eventually decreasing the pain for the study

subjects. This is thought to be achieved by distributing the weight according to the normal curvatures of the spine between the front and back sides of the trunk.

The study results lead to the fact that physical exercises undeniably relieve pain, improve muscle strength in general, increase muscle elasticity, increase the range of motion and remove the stiffness of joints caused by the restricted movement. "Therapeutic exercise plays an important role in pain prevention and alleviation by preserving or restoring proper function in the affected areas. This is accomplished through various exercises that maximize the range of movement, improve flexibility, increase muscle strength in muscles that stabilize painful joints" (27).

CONCLUSION

In this study, 31 rural women perform physical rehabilitation exercises to examine the effects of these exercises on the amount of pain in the neck and lower back. Group interaction effects or main effects are found, and a significant difference appears between the pre and post-tests on the trunk and neck. The variance in the pre and post-tests indicates that physical exercise increases various core muscle activities, and flexibility, especially in the neck and lower back regions. The study concludes that rehabilitation exercise programs can achieve better results in relieving pain in the neck and lower back regions for those whose conditions do not require surgical intervention.

APPLICABLE REMARKS

- The study recommends that Low-income rural women with neck and lower back pain who cannot afford to seek physician and rehabilitation centers consultancy, can considerably benefit from rehabilitation programs and exercises, if demonstrated in a low-cost brochure, to improve their function capability in performing tasks and activates in their daily life.

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CONFLICT OF INTEREST

The authors have no conflicts of interest relevant to this article to disclose.

AUTHORS' CONTRIBUTIONS

The authors declare that they have no financial affiliation (including research funding) or involvement with any commercial organization that has a direct financial interest in any matter included in this manuscript.

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