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Evaluation of the Effects of Therapeutic Posture Exercise on Spine Problems with Digital Analysis Method

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Abstract

It is known that exercise, which is one of the most effective and permanent intervention methods for postural spine problems, creates much more effective results if it is planned and applied specifically for the individual.

Within the scope of the research, it was aimed to evaluate the results of active dynamic therapeutic exercise intervention designed and applied to individuals with postural problems.

Fifteen patients (mean age 22.11± 6.95 years) who applied to the physiotherapy and rehabilitation unit were included in the study. Frontal and sagittal photographs of the patients, whose X-ray images were in the physiotherapy therapy unit of the hospital, were also taken before and after the intervention. In addition, demographic information, anthropometric measurements, manual muscle test, normal range of motion, muscle shortness and flexibility of all cases were recorded. Based on these data, an individual exercise program specific to each case was created and applied as 10 sessions lasting 1 hour, 2 days a week for 5 weeks. Before and after the exercise intervention, photographs of the individuals were taken again and their second evaluations were made with the "Posturezone" posture analysis application.

According to the results of the non-parametric Wilcoxon rank sum test applied to the research results, the deviation amount significantly decreased in the head, trunk and pelvis in the antero-posterior analysis after the exercise intervention ($p < 0.05$), while the decrease in the head and pelvis was significant in the mediolateral analysis. ($p < 0.05$), although there was a decrease in the mean value in the body, there was no statistically significant difference ($p > 0.05$).

According to the results of digital posture analysis applied within the scope of the study, it was observed that the exercise intervention performed specifically for the individuals had positive results. It was only observed that there was no significant reduction in the kyphosis angle in the sagittal plane. In longer interventions, a difference may be observed in this segment as well.

Key words: Therapeutic posture exercise, digital posture analysis, active participation.

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Introduction

Spinal misalignments are associated different pathologies of the spine such as spondylolisthesis, disc hernias, certain lesions of acute and chronic characteristics and back pain. In addition to the fact that the exercises to be applied will correct the spine by considering modern approaches. The active participation of the patient in the process in terms of proprioceptives will increase the motivation of the treatment and provide faster results (1).

Spinal biomechanics going beyond normal limits reduces functional capacity and negatively affects the quality of life. When these problems are not taken seriously enough, gait abnormalities, balance losses and falls will bring along the risks. In this case, the occupational life of the individuals will also be affected negatively (2).

Applying the right exercise approaches can reverse this negative situation. Systematic and regular exercise practices seem to be an effective method in the correction and protection of spinal biomechanics. Controlling spinal pathomechanisms with exercise as early as possible may prevent the consideration of surgical options.

Planning the exercise intervention according to the individual's needs will increase its effectiveness. Detailed evaluation of parameters such as spinal posture, flexibility and anthropometric properties and planning the most appropriate program for individuals will bring a target-oriented approach (3, 4).

In addition to classical assessment methods, the use of current technology will accelerate the decision-making process in terms of exercise by reducing the need for advanced medical examinations in some cases. There are softwares that can be used for posture evaluation on our mobile phones, which have become a routine of our daily lives. The use of these applications for patient follow-up in the clinic will provide an important advantage in terms of objective follow-up (5, 6).

In this study, the effect of individualized exercise on spinal problems was evaluated using both X-ray images and digital posture analysis method. Within the scope of the research, it was aimed to evaluate the results of active dynamic therapeutic exercise intervention designed and applied to individuals with postural problems.

Material and Methods

Fifteen patients (mean age 22.11± 6.95 years) who applied to physiotherapy and rehabilitation unit were included in the study. In the physiotherapy therapy unit of the hospital, photographs were taken from the frontal and sagittal planes of the cases before and after the intervention. In addition, demographic information, anthropometric measurements, manual muscle test, range of motion, muscle shortness and flexibility of all cases were recorded.

Within the scope of the study, taking into account the results of the evaluation, an individual exercise program specific to each case was created and applied as 10 sessions lasting 1 hour, 2 days a week for 5 weeks. In addition, a home exercise program was given to all cases. Before and after the exercise intervention, photographs of the individuals were taken again and the "Posturezone" posture analysis application was evaluated in the digital environment (Figure 1,2,3)

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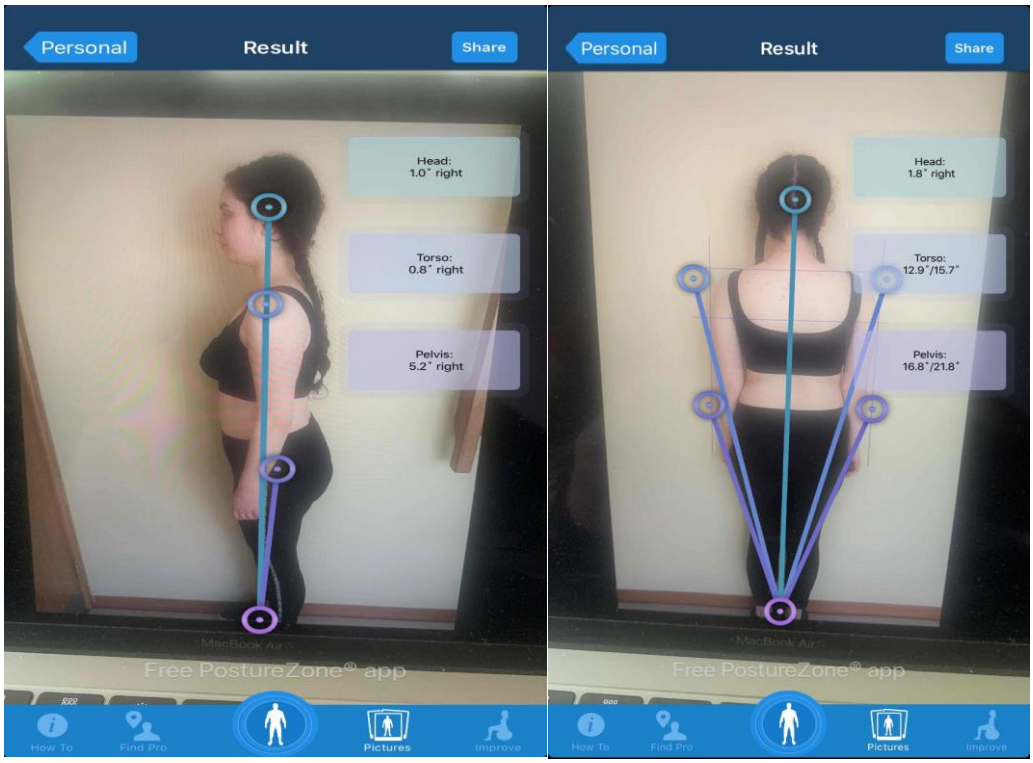

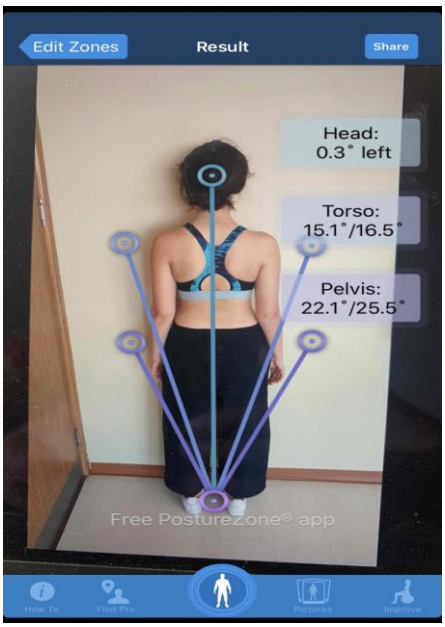

Figure 1-2-3. Posturezone analysis

Exercise Intervention with Reformer Pilates

Pilates is an exercise program that focuses on the abdominal region, waist region, back, hip, thigh and leg muscles to increase flexibility and muscular endurance in order to maintain body control. Exercises should be done in accordance with the principles of concentration, control, centering, fluent movement, precision and breathing (7).

Performing Pilates exercises by providing core stabilization is important for the realization of the centering principle. It is the realization of Pilates exercises in a dynamic setting by creating resistance with the help of a specially designed tool (8).

The section lying on the reformer device has a sliding structure and is supported by springs with varying resistance.

On this mobile system, there is a shoulder support and a headgear where you place your head. The functional structure of the instrument allows it to be adjusted individually. (Figure 4, 5).

Each session started with warm-up exercises. Then stretching in different positions, trunk flexibility exercises, upper and lower limb strecting and co- contraction exercises were performed. Later on, abdominal, hip, dorsal and shoulder muscle groups were strengthened with shoulder bridge, corkscrew, roll-up, roll down, clam, side kick, staggered legs, scissors, swimming, swan dive, breast stroke preparation, abdominal preparation and oblique preparation exercises in different sessions. After that strengthening exercises were performed by theraband to different muscle groups. And the session was finished with cool-down exercises (9-12)

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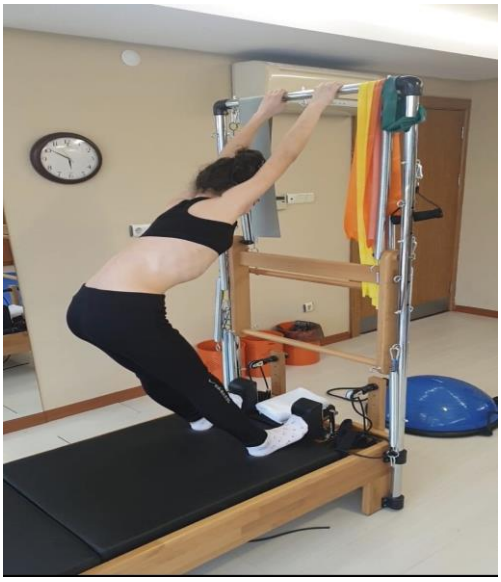

Figure 4. Pilates exercise

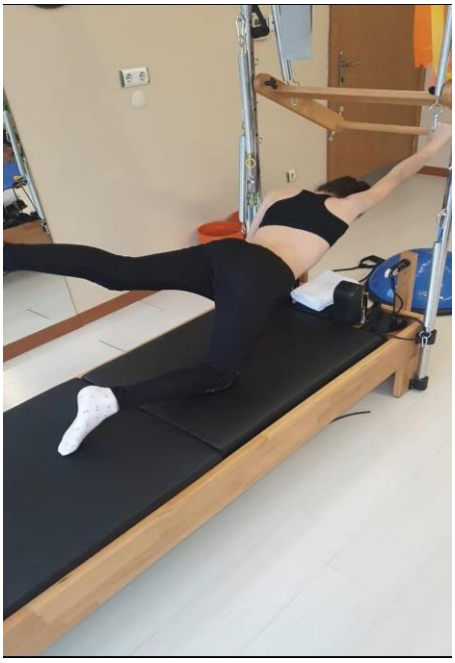

Figure 5. Pilates exercise

Results

According to the results of the non-parametric Wilcoxon rank sum test the deviation amount significantly decreased in the head, trunk and pelvis in the antero-posterior analysis after the exercise intervention ($p < 0.05$) (Figure 6), while the decrease in the head and pelvis was significant in the mediolateral analysis. ($p < 0.05$) (Figure 7) although there was a decrease in the mean value in the body, there was no statistically significant difference ($p > 0.05$).

According to the results of digital posture analysis applied within the scope of the study, it was observed that the exercise intervention performed specifically for the individuals had positive results. It was only observed that there was no significant reduction in the kyphosis angle in the sagittal plane. In longer interventions, a difference may be observed in this segment as well.

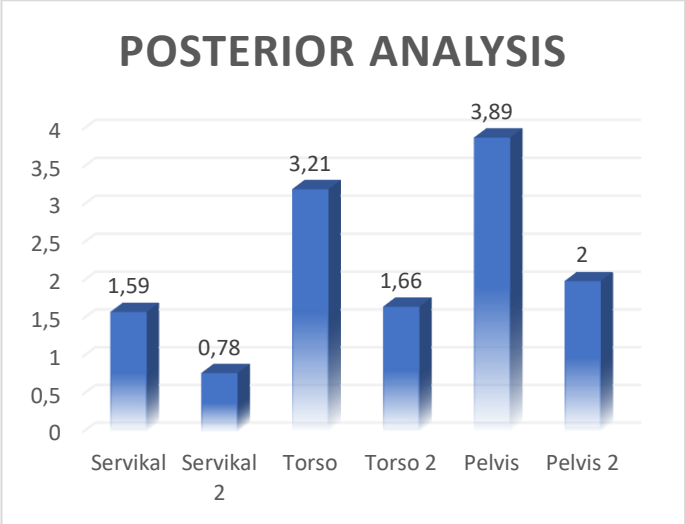

Figure 6. Posterior posture analysis

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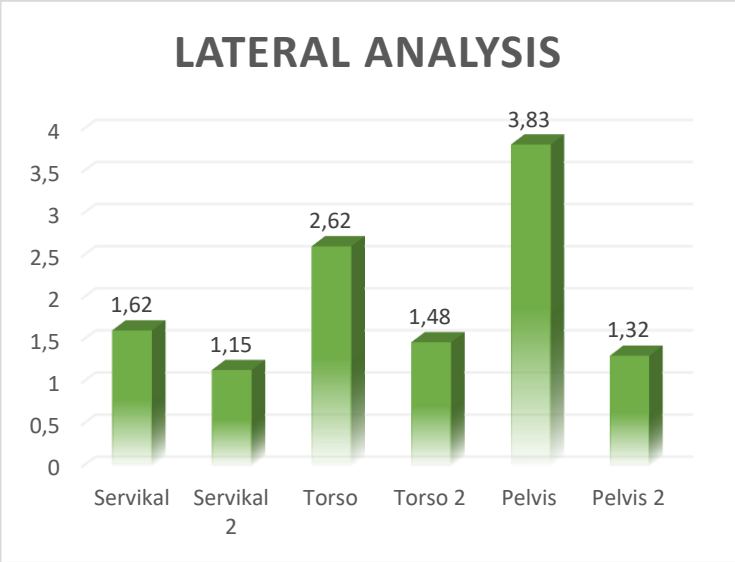

Figure 7. Lateral posture analysis

Discussion

Individual exercise interventions can have positive effects on spinal curves (sagittal and frontal). The effects of exercise intervention on the spine can be measured by methods such as radiography, dual inclinometer, and camera analysis.

In the study conducted by Kamali et al in 2016, stretching and strengthening exercises were applied to the back muscles in 25-minute sessions 3 days a week for 5 weeks in women with a kyphosis angle above 45 degrees between the ages of 18-30. It was observed that the kyphosis angle decreased significantly. Strengthening the back muscles is very important for postural alignment (3).

In a study carried out in 2015, exercises to increase flexibility and strengthen the lumbar region were applied for 8 weeks in women with hyperlordosis between the ages of 15-18. It was concluded that lumbar lordosis significantly decreased, the flexibility of the hamstring and hip flexor muscles increased, lumbar extensor flexibility and abdominal muscle strength increased (4).

When the results of the study were examined, it was observed that the exercise intervention specific to individuals was positive according to the digital analysis results. It was observed that there was no significant reduction in kyphosis angle only in the sagittal plane. In longer interventions, a difference may be observed in this segment. In addition, it is predicted that the regular use of the analysis made in computer environment by physiotherapists will have positive feedback in terms of presenting both practical and objective data. The systems by which physiotherapists can objectively measure the effects of exercise interventions are used very limitedly. For this reason, the use of photographic posture analysis applications, which is one of the advantages of contemporary smartphones, can be used as an effective alternative in terms of both obtaining objective data, ensuring patient follow-up and increasing motivation.

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