Effect of Clinical Pilates training on the fear of movement in patients with ankylosing spondylitis

Deran Oskay, Zeynep Tuna, Songül Baglan-Yentur

Abstract

Background/Aims: Exercise training has been shown to be beneficial in reducing symptoms in patients with ankylosing spondilitis. However, exercise effect on fear and avoidance of movement has not been assessed. The aim of this study was to evaluate the effect of Pilates training on kinesiophobia, disease activity, functional status and quality of life in patients with ankylosing spondilitis.

Methods: A total of 21 patients with ankylosing spondilitis with stable medication participated in the study. Tampa Scale for Kinesiophobia, Bath Ankylosing Spondilitis Disease Activity Index, Bath Ankylosing Spondilitis Functional Index, ankylosing spondilitis Quality of Life Questionnaire and Beck Depression Inventory were completed by patients before and after a 6-week modified Pilates training programme.

Findings: The patients were 41.6 ± 11.8 years old and the mean disease duration was 68 ± 87months. Mobility, disease acitivity and functional scores improved with exercise training ($P<0.05$). Moreover, quality of life, depression and kinesiophobia levels also showed significant improvement ($P<0.05$).

Conclusions: The results of this study showed that 6-week supervised modified Pilates training programme improved clinical symptoms in patients with Aankylosing spondilitis. Moreover, patients benefited from this exercise method regarding quality of life, depression and fear of movement (kinesiophobia) considerably.

Key words: ■ Ankylosing spondylitis ■ Clinical Pilates ■ Exercise training ■ Kinesiophobia

Submitted: 16 March 2017; accepted following double blind peer review: 12 April 2018

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Ankylosing spondylitis is a chronic, inflammatory rheumatologic disease with axial involvement. Peripheral and spinal joint involvement seen during the course of the disease causes limitation in movements and thus functional limitations. The main goal is to control pain and maintain function. As pain restricts mobility, the decrease in mobility starts a cycle that continues with pain and physical dysfunction. Limitation of mobility in ankylosing spondylitis develops in the natural process of the disease; however, inactivity also contributes negatively to the severity of joint involvement.

In the literature, there is strong evidence about the effects of exercise on ankylosing spondylitis (Ward et al, 2016). According to The Assessment of Spondyloarthritis International Society (ASAS) and European League Against Rheumatism (EULAR), exercise training is also essential besides long-term medical treatment in ankylosing spondylitis disease management. Several exercise types, such as aerobic exercise, respiratory exercises, Clinical Pilates, stretching and flexibility exercises have been shown to improve physical function and reduce symptoms in those patients (Dagfinrud et al, 2005).

Despite its great benefits, symptoms such as pain and fatigue in ankylosing spondylitis can reduce participation in exercise training. Another barrier that prevents participation in the exercise programme is kinesiophobia. Kinesiophobia has been described as 'fear of physical movement that arises from the sensation of pain and reinjury' (Kori et al, 1990). Not participating in exercise due to kinesophobia may increase the severity of the injury in the involved site due to pathophysiological processes resulting from immobilisation. This can also further reduce

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the success of exercise programmes (Filardo et al, 2015; Ogston et al, 2016; Zelle et al, 2016).

The Clinical Pilates method, developed by Joseph H Pilates, is preferred as a therapeutic modality in various musculoskeletal problems (Friedman and Eisen, 1980). In patients with low back pain, it has been shown to improve symptoms of the disease; this result is based on the stabilisation of the abdominal and back muscles during exercises and the increase of spinal elasticity and joint mobility (La Touche et al, 2008). The primary goal of Clinical Pilates training is to maintain a pain-free range of motion, while preserving spinal stabilisation. Altan et al (2012) found that Clinical Pilates training in ankylosing spondylitis patients contributed positively to the clinical symptoms of the patients. Although ankylosing spondylitis patients have benefited physically from Clinical Pilates exercises, its effect on kinesiophobia has not been studied in this patient group. For this reason, the aim of our study is to evaluate the effects of Clinical Pilates training on pain and kinesiophobia during movement in patients with ankylosing spondylitis.

METHODS

This work was carried out in cooperation with the Department of Rheumatology and the Rheumatologic Rehabilitation Unit at Gazi University, Ankara, Turkey.

Participants

Patients diagnosed with ankylosing spondylitis according to the ASAS/EULAR criteria by a rheumatology specialist participated in the study (Rudwaleit et al, 2009). They were informed about the exercise programme while they were being seen by the rheumatology specialist, and volunteer patients were enrolled on to the study. Patients who had received stable medication during the previous three months and who had no change in their laboratory findings indicating any exacerbation were included in the study. Patients who were unable to attend the exercise programme regularly for various reasons were excluded.

Ethical approval

The study protocol was approved by the local ethical committee of the university (approval number 11/04/2012–154). All the participants gave their signed informed consent after a detailed explanation about the study.

Exercise programme

Participants received progressive Clinical Pilates training under the supervision of a physiotherapist trained in Clinical Pilates. Before starting the exercise programme, an informative meeting was held for the patients on Clinical Pilates exercise training and a common schedule for exercise sessions was determined with the patients at the same meeting. The exercise schedule consisted of three sessions of group exercise a week and continued for six weeks.

Exercises were performed for 1 hour in each session in the exercise hall in the Department of Rheumatology and the Rheumatologic Rehabilitation Unit at Gazi University. Clinical Pilates exercises started with gentle exercises on the exercise mat and progressed to resistive exercises by adding resistive bands and exercise balls in the consequent weeks. Exercises included thoracic extension, general abdominal strengthening, core stabilisation exercises for the deep abdominal muscles (transversus abdominus and internal oblique) and posture exercises. Exercises were standardised Pilates mat exercises, such as bridges, curl-ups without trunk movement and all the exercises were repeated 10 times at the beginning. In the consecutive weeks, the repetitions increased to 15 or 20 according to the patient's tolerance.

If the patients felt pain or discomfort during any exercise, the exercise was modified by the physiotherapist into a suitable form for that patient. The assessments were repeated before and at the end of the exercise programme.

Outcome measurements

Age, height, body weight and gender of patients were recorded, as well as duration of disease, occupation, smoking and alcohol consumption.

Kinesiophobia

Kinesiophobia was evaluated by using the Turkish version of Tampa Scale for Kinesiophobia (TSK) (Yilmaz et al, 2011). This scale is comprised of 17 questions developed in order to measure fear of movement and re-injury. The scale includes injury/(re)injury and fear-avoidance parameters in work-related activities. The scale uses four point Likert scoring (1: totally disagree to 4: totally agree), and the individual obtains a total score ranging between 17 and 68. Higher scores obtained by the individual in the scale also show a high kinesiophobia. The use of total score is recommended for studies.

Mobility

Measurements including tragus to wall distance, the modified Schober's test (Sieper et al, 2009) thoracolumbar lateral flexion, cervical rotation and intermalleolar distance measurements of Bath Ankylosing Spondylitis Metrology Index (BASMI) were used to assess mobility (Sieper et al, 2009). The BASMI composite calculation was performed according to *Table 1*. Scores for each of the five

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Table 1. Borderlines for Bath Ankylosing Spondylitis Metrology Index parameters

	Mild (0)	Moderate (1)	Severe (2)
Cervical rotation (Mean of left and right)	>70 degrees	20–70 degrees	<20 degrees
Tragus to wall (Mean of left and right)	<15 cm	15–30 cm	>30 cm
Lumbar side flexion (Mean of left and right)	>10 cm	5–10 cm	<5 cm
Lumbar flexion (modified Schober)	>4 cm	2–4 cm	<2 cm
Intermalleolar distance	>100 cm	70–100 cm	<70 cm

measurements were added, and a total of 0–10 points for the BASMI score was calculated.

Functional level

The Turkish version of the Bath Ankylosing Spondylitis Functional Index (BASFI) was used to measure physical functional level (Yanik et al, 2005). The BASFI comprises 10 tasks that assess the degree of difficulty of each task performed:

- Putting on socks
- Bending forward to pick up a pen
- Reaching a high shelf
- Getting up from an armless chair
- Getting up from a floor from lying supine
- Standing unsupported
- Climbing steps without a handrail
- Looking over their shoulders
- Performing physically demanding activities
- Doing a full day's activities.

The total BASFI score is calculated by dividing the sum of the scores by 10.

Disease activity

The Turkish version of the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) was used to measure patient reported disease activity (Akkoc et al, 2005). It includes six questions related to five symptoms of ankylosing spondylitis: fatigue, spinal pain, joint pain and swelling, areas of local tenderness, and morning stiffness. A 10-cm visual analogue scale was used to measure the patients' responses to each question. A score between 0 and 10 is obtained for each question, and the mean of two questions relating to morning stiffness is used. The resulting overall score in which converted to a 0–10 scale in which 0=good and 10=bad.

Quality of life

Quality of life was assessed by using the Turkish version of the Ankylosing Spondylitis Quality of Life (ASQoL) Questionnaire (Duruöz et al, 2013). The questionnaire is comprised of 18 questions that evaluate the quality of life of patients with ankylosing spondylitis with the disease in mind and that is based on clear 'yes/no' answers. It assesses symptoms, functions, and concerns over the disease. The answer 'yes' is given a score of 1, and 0 is attributed to 'no' answers, and the total score ranges between 0 and 18. Higher scores show that the quality of life is low.

Statistical analysis

Statistical analyses were performed using Statistical Package for the Social Sciences software (version 22). The variables were investigated using both visual (e.g. histogram) and analytical methods (e.g. Shapiro-Wilk's test) to determine whether they are normally distributed. Descriptive analyses were presented using means and standard deviations for normally distributed variables. Since metrology index, quality of life, depression and kinesiophobia levels were normally distributed, paired sample *t*-tests was used to compare these parameters. Functional status and disease activity scores were regarded as non-parametric variables, thus Wilcoxon Signed Ranked test was used for analysis. A *P*-value of less than 0.05 was considered as statistically significant.

FINDINGS

A total of 21 patients participated in the study (*Figure 1);* 13 of the patients were women, 8 were males. The mean age of the group was 41.6 ± 11.8 years. Of the patients, 65% were actively working, 48% did not smoke and none of them consumed alcohol. The demographics of the participants are given in *Table 2*.

The functional status of patients (P=0.04) and disease activity scores (P=0.009) improved significantly (P=0.009) after 6 weeks of Clinical Pilates training (*Table 3*). Similarly, significant improvement was observed in spinal mobility levels (P=0.001), quality of life (P<0.001), depression (Beck Depression Inventory; Beck et al, 1961) (P<0.001) and kinesiophobia (P=0.013) scores (*Table 4*).

DISCUSSION

This is the first study to show that fear and avoidance of movement decrease with exercise training in patients with ankylosing spondylitis. Clinical Pilates training for 6 weeks significantly improved the clinical and

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functional status of these patients, as well as the levels of depression and kinesiophobia.

Ankylosing spondylitis treatment guidelines have indicated that exercise is the most important non-pharmacological treatment (Millner et al, 2016; Ward et al, 2016). In studies, aerobic and therapeutic exercises were applied alone or in combination, even in some studies by adding aquatic exercises (Millner et al, 2016). In these studies, patients benefited from exercise training regarding pain, mobility, functional and psycho-emotional status (Millner et al, 2016) In our study, 6 weeks of exercise training increased spinal mobility, improved functional status, and also reduced disease activity. The Clinical Pilates exercise concept aims to increase spinal mobility by maintaining stabilisation. For this reason, BASFI scores were expected to improve by this exercise programme, because it assesses spinal mobility related activities such as putting on socks or picking up something from the floor. However, it is surprising that the disease activity was reduced by exercise training, and this result is a great motivational factor to increase patient's compliance with exercise training.

Clinical Pilates exercises are theoretically based on mind/body coordination, requiring the individual's full concentration during exercise (Muscolino and Cipriani, 2004). When it is performed within a group, it also increase the social support and motivation to exercise. However, further research should focus on the effect of Clinical Pilates exercises on anxiety and depression to reveal the true importance of Clinical Pilates on mood status.

The Clinical Pilates concept is a method involving active stretching and strengthening exercises. However, some key principles of this concept are distinguished from other exercise methods. In the Pilates method, it is emphasised that the mind can manage the body and the body can be controlled from the center of the body – 'the core' (Muscolino and Cipriani, 2004). Concentration, controlled breathing and pain control are defined as important aspects of this method. For all these reasons, in our study, exercise was carried out without the fear of pain exacerbation, due to pain-free movements and physiotherapist supervision. Thus, it is thought that the patient felt more control over their body as they gave verbal feedback that their wellbeing increased with the consecutive exercise sessions. Therefore, it can be assumed that patients have decreased fear of pain or injury due to exercises parallel to control gain.

This study found that increased mobility and decreased disease activity led to clinical improvement. Similarly, Altan et al (2012) found that Pilates resulted in significant improvement in BASFI scores at weeks 12 and 24 compared to the control group. Also, Roşu et al (2014) combined three programsmes: Pilates, McKenzie and Heckscher, and they also showed

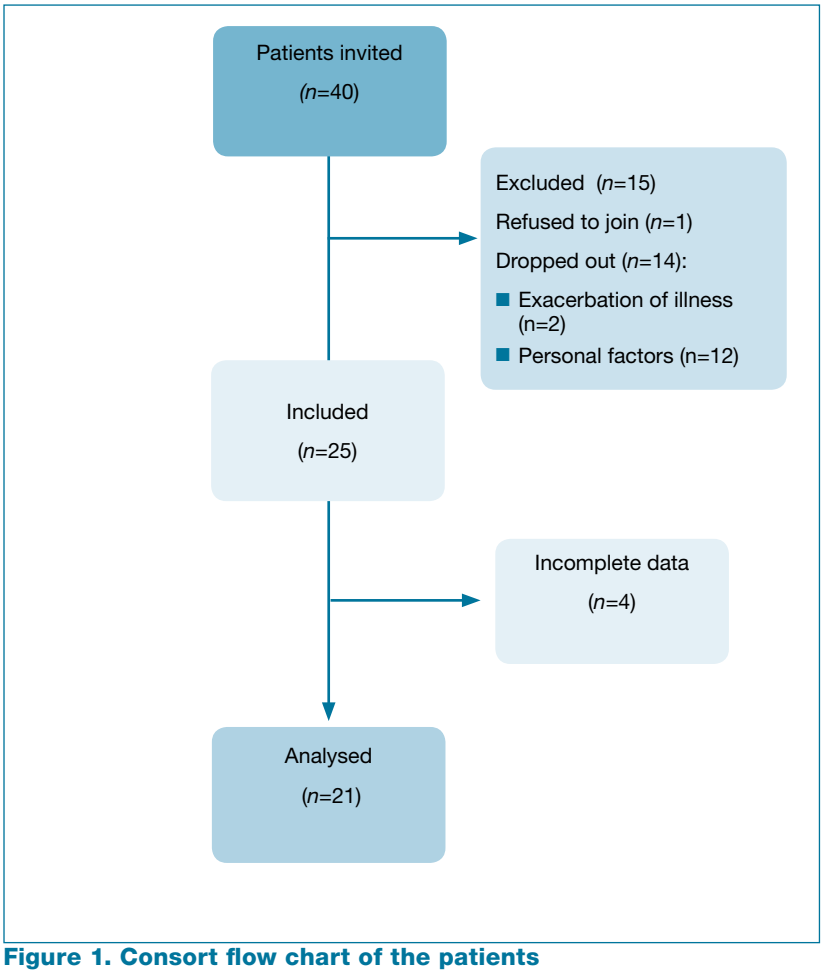

Figure 1. Consort flow chart of the patients

Table 2. Demographics of the participants

Mean age (years) ± standard deviation	41.6 ± 11.8	
Gender distribution	13 females	8 males
Duration of disease (min–max)	1–69 months	
Employment status	65% employed	35% unemployed
Smoking	48% yes	52% no
Alcohol consumption	0% yes	100% no

significant improvements in the BASDAI, BASFI, BASMI scores, as well as chest expansion and vital capacity results. In addition to the physical functions, improvement in kinesiophobia scores in this study is thought to increase the health-related quality of life of the patients. It was observed that they had increased motivation for the exercise sessions during the training programme. It was thought that the patients felt better with the exercise programme and this was evident with the quality of life scores in our study. Altan et al (2012) stated that they used the ankylosing spondylitis-specific

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quality of life questionnaire in an exercise study for the first time in their Pilates study and they emphasised the importance of disease-specific questionnaires. A significant improvement in disease-specific quality of life questionnaire scores was seen in our study.

Despite the low number of participants, significant improvements were seen in all outcome measures after exercise training. It may be interpreted that the Clinical Pilates exercise method might be a correct choice for this patient group.

Limitations

We are aware of the limitations throughout the study. The lack of a control group is considered to be the main limitation. In future studies, it is planned to include a control group receiving another exercise method beneficial for those patients. Although the patients were identified as sedentary after the first face-to-face interview, the initial physical activity level of the patients should also be assessed in further studies.

CONCLUSIONS

In conclusion, Clinical Pilates training, when performed under the supervision of a physiotherapist, might be beneficial to reduce kinesiophobia as well as improving the clinical status and health-related quality of life in ankylosing spondylitis patients. However, further well-designed research is needed to confirm these results in larger patient groups. **IJTR**

Conflict of interest: none declared

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