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Original article

REDUCING THE EFFECTS OF THROMBOPHILIA THROUGH PHYSICAL EXERCISE IN THE POSTPARTUM PERIOD. A CASE STUDY

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Abstract

Thrombophilia among pregnant women is a condition that can cause complications in the prepartum and postpartum periods, having as a starting point some protein deficiencies of the body as well as genetic predispositions that can favour the onset of this condition. In pregnant women, thrombophilia can lead to an increased rate of maternal mortality due to the occurrence of venous or arterial thrombosis and other complications such as antiphospholipid antibody syndrome and hyperhomocysteinemia. Thrombophilia research was initiated in 1965, when Olav Egeberg highlighted that patients suffering from this condition developed symptoms of thromboembolism earlier than the rest of the population and even complications during pregnancy, such as spontaneous abortion, preeclampsia, delayed endometrial growth and HELLP syndrome.

Objective. We aim to present the case of a patient who was diagnosed with this condition in the 28th week of pregnancy and was administered a treatment with injectable anticoagulants during the gestation period and after delivery.

Research methods. Study of the literature, case study, measurement and assessment methods. To highlight the effects of exercise on the body of the investigated woman in the postpartum period, we used: anthropometric measurements, Flamingo balance test, crunches, sit-ups, long jump and Shuttle Run test.

Results. After implementing the postpartum fitness programme in the weekly routine of the patient, we could notice a significant improvement of the results for all targeted fitness components. These improvements can be compared to the results of other studies having the same line of research and attesting that, in younger people, physical exercise can be an ally in the fight to reduce the risk of venous or arterial thrombosis.

Conclusions. The postpartum fitness programme significantly contributed to decreasing the patient's lumbar pain and improving her upper body mobility within a relatively short period of time (12 weeks).

Keywords: physical exercise, thrombophilia, prepartum, postpartum.

Introduction

Thrombophilia is a condition that can be either inherited (the highest incidence) or acquired over time, being caused by excessive blood clotting that leads to the occurrence of thrombi in blood circulation due to the quantitative deficiency of some coagulation factors such as protein C, protein S and antithrombin III (Heit et al., 2005).

This condition was first described in 1965 by Olav Egeberg. For inherited thrombophilia, he reported that patients developed the first symptoms of thromboembolism earlier than the rest of the population and even complications during pregnancy, such as spontaneous abortion, preeclampsia, delayed endometrial growth and HELLP syndrome (James, 2009).

In pregnant women, thrombophilia can be a major cause of maternal mortality due to the occurrence of venous or arterial thrombosis or as a result of possible clinical complications such as antiphospholipid antibody syndrome and hyperhomocysteinemia. To reduce the incidence of this condition among pregnant women, early identification of patients at risk who do not show clinical symptoms is required. After evaluating the family history, the examination should be performed with the help of laboratory tests that can determine the existence of this condition. (James, 2010)

Early diagnosis and the use of specialised treatments can reduce complications throughout the gestation period (Rosendaal, 1997).

Recent studies addressing the impact of exercise on patients with thrombophilia have revealed that an active lifestyle can reduce the risk of thrombosis and is beneficial to their health.

Although some data are still considered insufficient, studies conducted so far have shown that, especially in younger people and those with

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cardiovascular or kidney disease, there is clear evidence that physical activity is beneficial for reducing the thrombotic risk, while in the elderly, this risk is unlikely to be influenced by physical activity (Adams et al., 2009).

Case study

We present the case of a 26-year-old patient (P.A.) at her first pregnancy, who had medical complications both during pregnancy and especially after delivery.

The patient lives in the urban area, is a university graduate and was employed by a multinational company before and during pregnancy. We mention that, before pregnancy, the patient had a sedentary lifestyle both at work, because her activity took place only in the office, and in her daily life, because she did not practise leisure-time physical activities.

Following preliminary clinical examinations after the onset of pregnancy, the patient was declared clinically healthy, without any associated conditions that might have affected the evolution of her pregnancy. During the gestation period, after some routine investigations, the patient was diagnosed with thrombophilia (in the 28th week of pregnancy). Following the establishment of this diagnosis, the patient had to receive a treatment based on injectable anticoagulants both throughout pregnancy and after delivery.

Although delivery started normally, at 37 weeks and 5 days, it ended with a caesarean section. At birth, the baby weighed 2.4 kilogrammes.

After delivery, the patient continued to be administered injectable anticoagulants for 40 days, according to medical indications. Twenty-one days after delivery, she underwent a spontaneous opening of the caesarean section during the night, followed by heavy bleeding. The patient presented to the emergency room of an emergency medical unit, where it was established that her section had spontaneously opened and she had lost a considerable amount of blood due to the administration of anticoagulant drugs that had inhibited the wound closure and healing. After this event, her dose of anticoagulants was reduced but their administration was maintained until the end of the 40 days after delivery.

Forty days after delivery, the patient expressed her desire to start a physical training programme for postnatal recovery in order to regain her muscle tone, exercise capacity and general mobility. Unfortunately, this was not possible beyond the 40-day period because of the state of emergency caused by the appearance and spread of the SARS-CoV-2 virus. As a result of restrictions imposed by the authorities, the patient's level of physical activity decreased even more in the next 3 months, as she went out only for short periods of time to buy food and non-food products necessary for daily living but also raising and caring for her new baby. All this time, the patient complained of increasing physical and mental degradation as well as the intensification of her lumbar pain acquired during pregnancy and exacerbated by the sedentary lifestyle and daily activities specific to a mother caring for a newborn.

The patient started the postpartum physical training programme approximately 5 months after delivery. From the very beginning, she took part in the training programme with a frequency of 2 to 3 workouts per week.

Periodisation of postpartum physical training

At the start of the postpartum physical training programme, the patient had the approval of her attending physician and benefited from a medical history including the application of a questionnaire on the changes felt during and after pregnancy but also from anthropometric measurements and the determination of her fitness level through specific means of assessment.

The first training macrocycle was designed for 12 weeks and had the following objectives:

1. Developing basic and combined motor skills
2. Reducing postural imbalances in the spine
3. Regaining joint mobility and muscle elasticity
4. Increasing anaerobic and aerobic exercise capacity

Structure of the postpartum training programme

The training programme consisted of 3 stages and lasted 12 weeks in the 3 + 1 system (3 weeks of loading + 1 week of active recovery).

Stage I

It was conducted for 4 weeks, and its main objective was the anatomical adaptation of the body to exercise as well as regaining joint mobility and muscle elasticity. Each week included 2 training sessions for the anatomical adaptation of the body to exercise, general strength and mobility.

Stage II

It was mainly focused on toning the upper and lower body muscles in parallel with the development of joint and muscle mobility with the help of stretching exercises. The training programme was split into 3 sessions as follows:

- session 1 - upper body toning

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- session 2 - lower body toning
- session 3 - stretching and mobility

Stage III

It also consisted of 3 training sessions per week, and the emphasis was mainly placed on toning the upper and lower body muscles as well as developing aerobic exercise capacity, given that the patient was already at an advanced stage of evolution of the postpartum period; this allowed conducting one training session per week, whose main objective was the development of aerobic exercise capacity.

Exercises and methods used to implement the postpartum training programme

1. Preparing the body for exercise and selectively influencing the musculoskeletal system

The preparation of the patient's body for exercise was initiated only after a brief assessment of her general condition in both physical and emotional terms and after she was presented the objectives of the training lesson.

This preparation started with walking and variations of walking (e.g.: walking on heels, walking on toes, walking on the outside of the foot), during which the coordinator could assess the patient's readiness to perform exercise and decide if she was able to take part in the proposed programme.

The selective influence on the musculoskeletal system aims to engage most large joints of the body through analytical exercises, slightly increasing heart rate and body temperature by up to one degree Celsius.

2. Exercises to reduce postural disorders by the awareness and correction of daily motor acts, actions and activities

The main motor acts that can lead to postural disorders if performed incorrectly are: walking, sitting, lying supine, lifting from lying supine, anterior trunk bending, lifting and carrying weights.

To correct these poor motor acts and activities, the following are necessary:

- awareness of incorrect executions;
- studying the correct and incorrect positions and movements with the help of kilogrammes;
- correcting them and learning new ways of execution;
- consolidating them until the formation of dynamic stereotypes related to the execution of usual motor acts and actions.

- Methodological indications

- They aimed to correct long-term poor attitudes and movements with applicability in everyday life.
- Emphasis was put on improving the execution of movements commonly performed by the patient.
- The patient's progress was monitored, and the methodological indications were repeated until they were assimilated.

3. Exercises to correct orthostatic position and prevent postural imbalances in the spine

E.g.: Starting position (SP): Lying supine, knees bent and feet close together

T.1. Lifting the pelvis off the floor

T.2. Return to SP

4. Exercises to tone the back muscles

E.g.: SP Standing with legs apart and the trunk in an oblique position supported by the TRX arms

T.1. Arm traction with elbows close to body

T.2. Return to SP

5. Exercises to tone the paravertebral muscles on each spinal segment

E.g.: SP Sitting on knees with support on palms, the right upper limb stretched at shoulder level

T.1. Extension of the right upper limb in the posterior plane above shoulder level

T.2. Return to SP

6. Exercises to tone the chest muscles

E.g.: SP Sitting on the chest press with arms at shoulder level and elbows bent

T.1. Arm extension and pushing the handles forward

T.2. Return to SP

7. Exercises to tone the abdominal muscles

E.g.: SP Lying supine, knees bent, feet on the floor and hands on the thighs

T.1. Crunches with palms touching the knees

T.2. Return to SP

8. Exercises to tone the lower body muscles

E.g.: SP Sitting on the quadriceps extension machine

T.1. Full knee extension

T.2. Return to SP

9. Exercises to tone the arm muscles

E.g.: SP Standing with legs apart in front of a fixed ladder, an elastic band hanging from a step above head level and held in each hand with elbows bent and forearms parallel to the floor

T.1. Full arm extension downwards

T.2. Return to SP

10. Exercises to develop balance and proprioception in the lower body

E.g.: SP Sitting on the gym bench, arms close to body, palms grasping the anterior edge of the bench

T.1. Body weight transfer mainly on the right gluteal muscles and slight trunk bending to the right side

T.2. Return to SP

T.3. Body weight transfer mainly on the left gluteal muscles and slight trunk bending to the left side

T.4. Return to SP

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11. Exercises to learn various breathing techniques and maximise their efficiency

E.g.: Abdominal breathing

- Methodological indications and way of execution

This type of breathing will be performed while standing with legs apart, sitting or lying sideways, with the back straight and the abdominal muscles relaxed. It is recommended to place the right palm on the abdomen and the left palm on the chest and to follow, during exercise, the oscillation of the right palm without moving the left palm while inhaling through the nose and exhaling through the mouth.

Table 1. Periodisation of postpartum physical training

Macrocycle		
Mesocycle 1 Anatomical adaptation 4 microcycles of one week each 2 sessions/week	Mesocycle 2 Toning 4 microcycles of one week each 3 sessions/week	Mesocycle 3 Toning + aerobic endurance 4 microcycles of one week each 3 sessions/week
Session 1 - anatomical adaptation + mobility Session 2 - anatomical adaptation + mobility	Session 1 - upper body toning Session 2 - lower body toning Session 3 - stretching + mobility	Session 1 - upper body toning Session 2 - lower body toning Session 3 - mobility + aerobic endurance

It is the most effective way of breathing although in most cases (incorrect posture, lack of training or even muscle tension) is often neglected or forgotten in favour of superficial breathing.

This type of breathing is achieved by involving the diaphragmatic wall to a greater extent compared to the action of the rib cage.

The movement generated by the diaphragm action facilitates higher oxygen supply by engaging the lower lobes of the lung and can decrease blood pressure and stimulate digestion.

The periodisation of postpartum physical training is shown in Table 1.

Results

At the end of the 12 weeks of training, we can highlight the following comparative data obtained from anthropometric measurements (Figure 1), specific tests (Table 2) to determine the fitness level and questionnaires (Table 3) developed to reveal the changes felt by the patient since the beginning of the postpartum physical training programme.

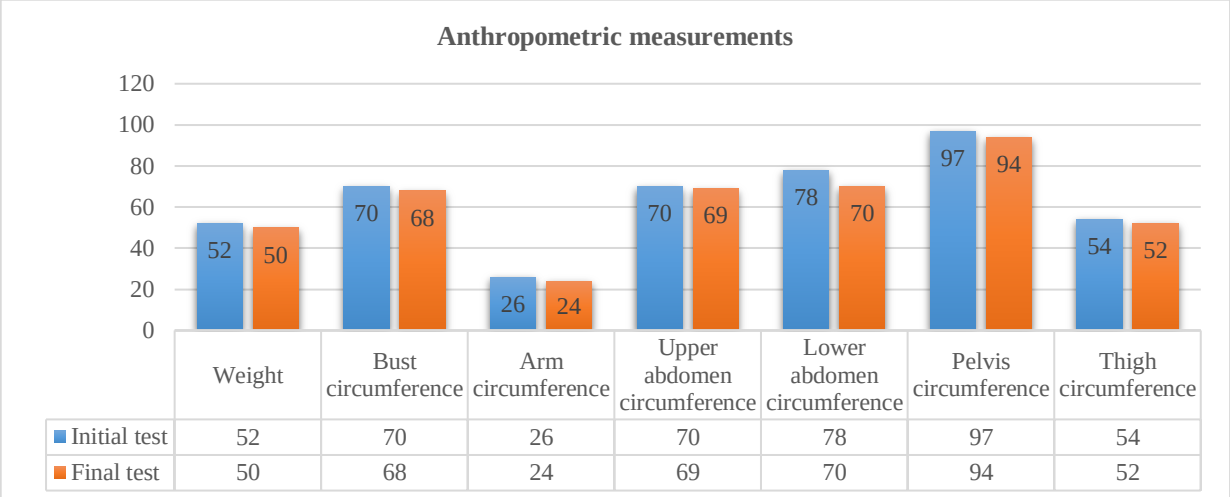

Figure 1. Anthropometric measurements

Table 2. Results obtained after applying specific tests to determine the fitness level

	Fitness level test after the first delivery	**Fitness level test after the second delivery**
Flamingo balance test	19 attempts	15 attempts
Crunches	-10 cm	-1 cm
Long jump	125 cm	145 cm
Sit-ups	10 repeats	17 repeats
Shuttle Run	Level 3	Level 4
Overall rating	**Poor**	**Good**

Table 3. Results obtained after applying the postpartum questionnaire

Changes felt during and after pregnancy until the start of the physical training programme	**Changes felt after the first 12 weeks of exercise**
• diagnosis of thrombophilia	• after completion of the 40-day postpartum treatment, it was not necessary to restart it
• blood pressure fluctuations	• normal blood pressure (no fluctuations)
• discomfort in the lumbar region during and after pregnancy (exacerbation of lumbar lordosis)	• no pain was reported in the lumbar region
• spontaneous opening of the caesarean section, followed by heavy bleeding	• no pain was reported in the area of caesarean section
• limitation of upper body mobility (anterior trunk flexion)	• regaining upper body mobility and abdominal muscle tone

After summarising the data obtained from the implementation of the postpartum physical training programme in the weekly routine of this patient, we could notice a significant improvement of all monitored parameters. These improvements can be compared to the results of other studies having the same line of research and attesting that, in younger people, physical exercise can be an ally in the fight to reduce the risk of venous or arterial thrombosis. All these data highlight that the effects of thrombophilia can be reduced by using periodisation adapted to the characteristics of each patient (age, fitness level, associated disorders, etc.) and thus the risk of developing complications during pregnancy are diminished (Adams et al., 2009).

Conclusions

In this case, the data analysis highlights the improvement of all results obtained due to the implementation of a specific exercise programme aimed at regaining exercise capacity, joint mobility and muscle tone but also improving the changes felt during and after pregnancy.

The data show that, although the patient had a more difficult prepartum and postpartum course because of several disorders and complications that occurred spontaneously, she managed to reach a much-improved fitness level compared to the gestation period and even the pre-pregnancy period due to the regular practice of physical exercise.

In terms of discomfort felt in the lumbar area as a result of the exacerbation of her lumbar lordosis and the 16-kg weight gain during pregnancy, all this corroborated with her total lack of physical activity due to the restrictions imposed by the onset of the new Coronavirus, we can state that the postpartum fitness programme significantly contributed to decreasing the patient's lumbar pain and improving her upper body mobility within a relatively short period of time (12 weeks).

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