Therapeutic Effect of Two Muscle Strengthening Programs in Patients with Patellofemoral Pain Syndrome from Bogota, Colombia.

Experimental Study, Clinical Controlled Trial.

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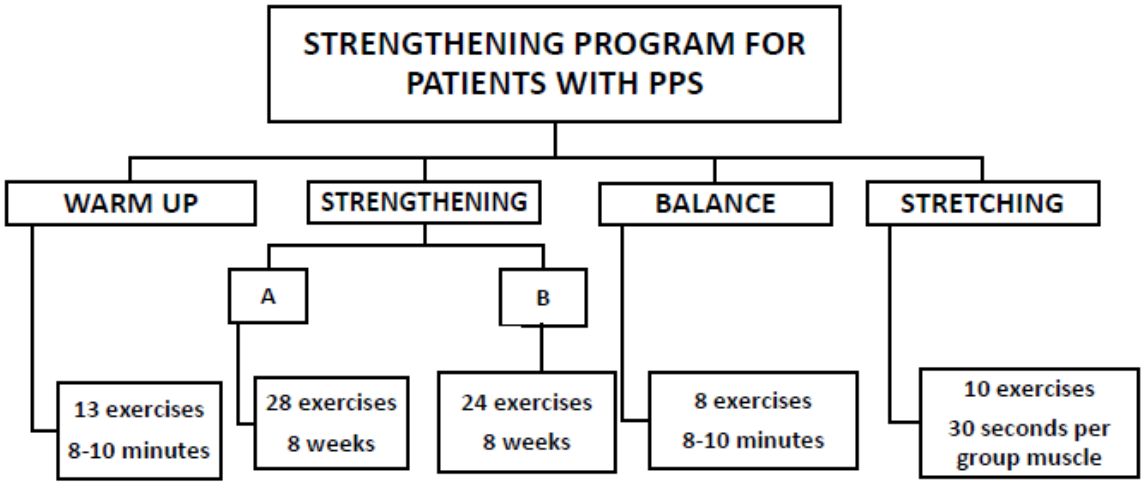
INTERVENTION PROTOCOL

From the following scheme (Scheme 3), each training session of the muscle strengthening program was structured for each of the intervention groups, which was based on the principles of training and the Earl and Hoch protocol described in the theoretical framework.

Scheme 3: A y B Strengthening Program



After the adjustments described in the pilot test, the strengthening program was applied to the forty patients who were previously randomized to the intervention protocols for groups A and B.

Each of the exercise sessions lasted approximately 45 to 60 minutes, of which, the first 8 to 10 minutes were dedicated to the initial warm-up exercises, the same for program A and B, which gave way to the phase central to the session, that is to say the strengthening exercises: group B took about five minutes less to complete it, because they performed an exercise less than group A in each of the three phases set out in the program; This phase of strengthening lasted approximately 20 to 30 minutes of the total session.

Each session was divided into four parts, of which the second part (central strengthening phase) included between 24 and 28 exercises in total, group A and B respectively. In addition to this, the anatomical conditioning phase was carried out in two weeks, in which 5 to 6 strengthening exercises were prescribed depending on the treatment group, but for both groups the volume was two sets of 10 repetitions, with approximately 30 seconds rest between sets and between exercises, with an execution speed of 1/1 (concentric / eccentric contraction ratio) that allowed patients to adapt to adequate movement control and therefore, joint protection.

After the conditioning phase, from the third to the sixth week of intervention, the strengthening or resistance strength gain phase was performed, in which 6 to 7 exercises were performed; that is, the training was progressed with the addition of an exercise and also with the increase of series and repetitions as follows: from the third to the fifth week the volume was 2 sets of 15 repetitions, with a 20 seconds rest and a 2/2 contraction speed, which allowed greater control of the movement by decreasing the speed of execution of the movement; In the sixth week the participants went from performing two sets of 15 repetitions to performing 3 sets of 15 repetitions, with a decrease in rest between sets and exercises of 10 seconds and a decrease in contraction speed (ratio 3/3) that implied greater neuromuscular control over the exercise performed and therefore significant increases in muscle strength.

During the last two weeks of treatment, both groups increased the number of exercises (7 exercises group B and 8 exercises group A) and some of the exercises changed to exercises of greater difficulty, but with a decrease in the volume of training in the seventh week (two sets of 10 repetitions for session 21 and two sets of 15 repetitions for sessions 22 and 23) and this increase in the eighth and final week of training (three sets of 15 repetitions). The reason for these changes was based on the principles of progression and overload, as well as on ensuring the correct execution of the exercises without compensation from other muscle groups, especially the lumbar muscles, and also to avoid premature fatigue observed in the pilot test.

The warm-up included 13 exercises, performed in an average time of 8 to 10 minutes and in the same way during the eight weeks of intervention, while, in the fourth part of the session, final stretching or return to calm, the participants performed 8 exercises during the first 6 weeks of intervention and 10 exercises in the last two weeks. Each exercise was performed for 30 seconds, which took approximately 8 to 10 minutes to complete them. Finally, the neuromuscular component (static balance training with one-foot balance exercises) was performed after muscle strengthening exercises. It was based on 8 exercises, which changed every two weeks with a duration between 30 to 45 seconds each, and between one to two repetitions per exercise depending on the week of intervention. The three phases mentioned above were exactly the same for both treatment groups.

All participants participated in groups of four people per session, three exercise sessions per week for eight weeks in total, at the IPS-CAFAM (Institución Prestadora de Salud de la Caja de Compensación Familiar) Rehabilitation Center, for a total of twenty-four sessions, which were supervised by a Physiotherapist, who was responsible not only to verify the quality in the performance of each of the exercises, but to teach during the first two weeks of intervention (anatomical conditioning phase) the fundamental bases of adequate breathing and feed them back during all the intervention protocol, as well as guaranteeing a correct posture in performing the training and thus avoiding the appearance of low back pain as a result of a poor training technique, as well as the increase in intra- abdominal pressure generated by the “pushing” when it is not known to breathe properly during strength training.

The hydration of each participant was also crucial during each training session. Similarly and prior to the start of the protocol, all patients were instructed and suggested the importance of wearing appropriate footwear for training (sports sneakers, sportswear - during the first two weeks they were suggested to wear shorts to observe the position of the knees during the exercises and later the use of liquefied pants up to the ankle to avoid rubbing the elastic bands with the skin-; likewise, they were instructed to bring water bottle, towel to dry the sweat and not to use elements that could injure them during the exercise, such as bracelets or necklaces.

However, it is important to mention that it was agreed with about 15% of the patients residing in sites far from the place where the program was carried out, at least two of the three sessions in the rehabilitation center, and the third session at home, taking into account that it was important to supervise the performance of the exercises by the Physiotherapist in charge of the intervention program. To do this, the participants attached the necessary evidence in the form of photos and videos to support their commitment in carrying out the exercises. This aspect was controlled throughout the time by the physiotherapist.