The Mézières Method as a Novel Treatment for Elite Spanish Second-Division Soccer League Players With Low Back Pain: A Randomized Controlled Trial

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Objectives: To evaluate the efficacy of 24 weeks of treatment with Mézières method in a Spanish elite second-division soccer team with low back pain (LBP), analyzing their state of back health, flexibility, pain, and steps speed. ***Design:*** Double-blind randomized controlled trial. ***Methods:*** A total of 20 players with LBP from the second soccer division league were allocated equally to the experimental and control groups (n = 10) as per selection criteria and participated in 2 different rehabilitation programs. The postural Mézières method was implemented in the experimental group, whereas the standard European treatment protocol for LBP was implemented in the control group. Both treatments had a twice weekly session of 40 minutes duration for 24 weeks consecutively with a follow-up in the fourth, 12th, and 24th weeks. ***Results:*** Multivariate analysis of covariance with the baseline assessment as a covariance showed a significant difference between groups at the 12th and 24th weeks of the treatment for pain and back functionality. A relevant difference between the experimental and control groups was shown only at the 24th week of the treatment ($P < .05$) for back flexibility. A significant difference between groups was reported for the quality of life scale and steps speed at the 24th week of the treatment ($P > .05$). ***Conclusion:*** The Mézières method showed a positive effect in the elite soccer athletes with nonspecific chronic LBP and can be used as an alternative treatment.

Keywords*:* postural treatment, back flexibility, stretching, reeducation

Low back pain (LBP) and lower limb injury are reported to be among the most common injuries in elite soccer players, with a yearly LBP prevalence of 64% and lower limb injury rate during competition varying between ~18% and 80%.[1,2] Thus, the LBP issue has received a lot of attention from the research community.[3] It seems that competitive sports are significantly associated with LBP.[4] Eirale et al[5] and Bayraktar et al[6] reported that 1.3% and 6.5% of all elite male football players experienced LBP, respectively.

High levels of physical activity, height, weight, muscular endurance, and flexibility have been considered risk factors for LBP in young athletes.[7,8] LBP may have negative consequences for performance in football as it has been proved to affect trunk as well as lower limb kinematics in walking and running.[9,10] Apart from LBP affecting how athletes move, which could harm their performance, a 2-year prospective radiological investigation indicated that playing football is a significant risk factor for the onset of LBP and progression of intervertebral disc degeneration.[11] A recent systematic review and meta-analysis concluded that people with LBP also have a reduced range of motion and proprioception and move more slowly than people without LBP.[12]

Investigations of both athletic and nonathletic populations with LBP have demonstrated deficits in trunk muscles, including reduced endurance and strength of the lumbar extensor muscles. Other symptoms are hyperactivation of the quadratus lumborum muscle, smaller tonus of the multifidus muscle, abdominal muscle overactivity, and inability to draw in the abdominal wall.[3,9,12–15] Other studies using ultrasound imaging[16–18] revealed structural changes and significant decreases in the shear motion of the thoracolumbar fascia. Referring to these data and the postural models for pain treatment,[19,20] Mézières method, focused on global stretching positions, can be a useful physiotherapeutic treatment for the LBP of soccer players. Lena et al[21] referred to an improvement in LBP symptoms, performance, general health conditions, and a back disability score decrease after a 24-week implementation of Mézières method in elite athletes of rhythmic gymnastics. The objective of this treatment is to stretch muscles that are shortened using the properties of the viscoelastic tissue and to stimulate the contraction of muscles with antagonistic function to avoid postural asymmetry.[22]

On the other hand, other randomized controlled trials[23–27] reported an improvement analyzing the same outcomes as disability index, pain scale, health status through the implementation of global postural reeducation (GPR), derivation of Mézières method, and isostretching postures in nonathletic participants with LBP during 24 weeks of treatment. According to these trials,[23–27] the participants of each experimental group performed different postures of the GPR method applied in the anterior or posterior chain or in both chains according to individual needs. In the trial by Adorno and Brasil-Neto,[25] a second experimental group did a combined GPR and isostretching treatment without detailing the intensity and series repetitions. Guastala et al[26] described the maintenance of 3 postures with a duration of 15 minutes per posture. The frequency was 1 to 2 times a week with a duration of 30 to 60 minutes each session. The intervention lasted from 6 to 24 weeks. Regarding the control groups, the participants performed

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an isostretching program, nothing or drug treatment, a back school program, or static supine stretches. The intensity was not described except for the back school in the study by Soares et al[24] and for static stretching in the study by Matos et al.[27]

Furthermore, as previous studies have shown that postural therapies directed to the low back can decrease pain and disability and can also improve the range of back flexion, our first aim was to verify the effectivity of these assessments in 24 weeks implementing Mézières method in elite soccer players with LBP.

Thus, the secondary aim was to analyze the quality of life and steps speed of the same participants after the Mézières treatment during the same period compared with the control group, who followed the conventional treatment for LBP.

Methods

Design

A randomized controlled trial was conducted with a blinded evaluator/assessor and with a 24-week follow-up according to the CONSORT statement[28].

Participants

All players from the team of a Spanish Second Division Football League were eligible to participate in this study. The study was approved by the Human Research Ethics Committee of UCAM Catholic University of Murcia (Prot. no.: 6572) with additional registration on Clinicaltrial.gov (NCT03849053). Players provided written informed consent with the protection of the participants' rights. The intervention took place in the training camp during January–June 2017 (Figure 1).

Eligibility

For this study, other inclusion criteria were 18- to 39-year-old male soccer players with diagnosis of chronic primary nonspecific LBP[29] with a minimum of ≥3 months duration and a score of 3.0 to 8.0 cm on a 0- to 10-cm visual analog scale for pain (VAS).[30] Patients with a diagnosis of LBP due to other causes, such as protrusion of the intervertebral disc, back fractures in the past years, tumors, spondylolisthesis, ankylosing spondylitis, infection, and other sport-related types of symptoms, were excluded from the study.

Intervention

In brief, the intervention trial was implemented after the football session to evaluate back mobility,[31] pain symptoms, functionality, quality of life, and steps speed between an experimental and a control group. The control group received 2 sessions per week of the conventional intervention program; its protocol was formulated according to the European clinical guidelines (www.backpaineurope.org)[32] for LBP treatment. The experimental group attended the Mézières method intervention with a duration of twice weekly 40- to 60-minute sessions for 24 weeks in total with a follow-up at 4, 12, and 24 weeks. This treatment was applied by the same certified physiotherapist with a minimum of 5 years' experience in Mézières method.

Experimental Group

Details of the Mézières method protocol for the experimental group have been published previously[21] (Appendix A).

This intervention included a total of 3 lying postures of the Mézières therapy[19,20,22] presented in Appendix A. Specifically, the postures held over 24 weeks were: for the first 4 weeks, the first posture was maintained with soccer player in supine position; the following 8 weeks, the second posture was held in supine position with upper limbs abducted to 120°; and for the last 12 weeks, the third posture was held with the soccer player in sitting position.

Each posture was practiced for approximately 40 minutes. No more than 1 posture was maintained in each session. The Mézières therapy was adapted depending on the physical condition of back pain of each athlete.[21,29] At baseline, it was necessary to perform a general physical examination. The aim was to know the state in which muscle chains were found as well as to study the asymmetric imbalances of posture and the curves of the back, looking for a global and individualized analysis of each person as it is a personalized therapy with a maximum duration of 60 minutes.[29] The Mézières treatment prioritized breathing exercise, spine mobility, and stretching of the back muscles with special attention to the diaphragmatic, paravertebral, and latissimus dorsi muscles. Appendix A shows a detailed postural treatment protocol.

Control Group

Regarding the control group, the applied treatment had the same duration and the same follow-up as the experimental group but different characteristics (Appendix B). This physiotherapeutic rehabilitation was based on the same principle baseline evaluation as the experimental group.

The posterior muscular chain was treated, and the rehabilitation was divided into 3 exercise groups based on the times of the treatment (4, 12, and 24 wk). Massage and the electrotherapy application were implemented following the European clinical guidelines[32] only in the control group. In general, the full rehabilitation protocol consisted of stretching techniques, movement facilitation, soft therapy, spinal mobility, and electrostimulation (Appendix B).

Outcomes

Primary. *Pain intensity* was measured with the VAS, which consists of a 10-cm horizontal line representing one end with "no pain at all" and the other end with "as bad as it could possibly be." Each soccer player was asked to enter in the line considering his pain perception, and the score was measured by the distance on the line. The reliability and validity of the VAS has been established previously.[30]

Back flexibility was measured with a simple longitudinal measurement of lower back and hamstring muscles flexibility commonly known as the classic "sit and reach"[33] test, which is mainly used by clinicians and physical sports trainers. It was performed in a seated position with the knees extended and the feet placed firmly against a vertical support. The soccer player reached forward along the measuring line as far as possible with the arms at the same level; the score was recorded to the nearest 0.1 cm as the distance reached by the hands, using the level of the feet as recording 100 so that any measure that did not reach the toes was <100 and any measure beyond the toes was >100.[34] The validity and reliability of sit and reach is well documented.[35]

Back disability is mostly measured with the Roland-Morris questionnaire (RMQ) for patients with LBP.[36] It is a short, simple, sensitive, and adaptive measure for quantifying self-rated disability due to back pain. It can be named as a health status measure designed to be completed by patients to assess physical disability

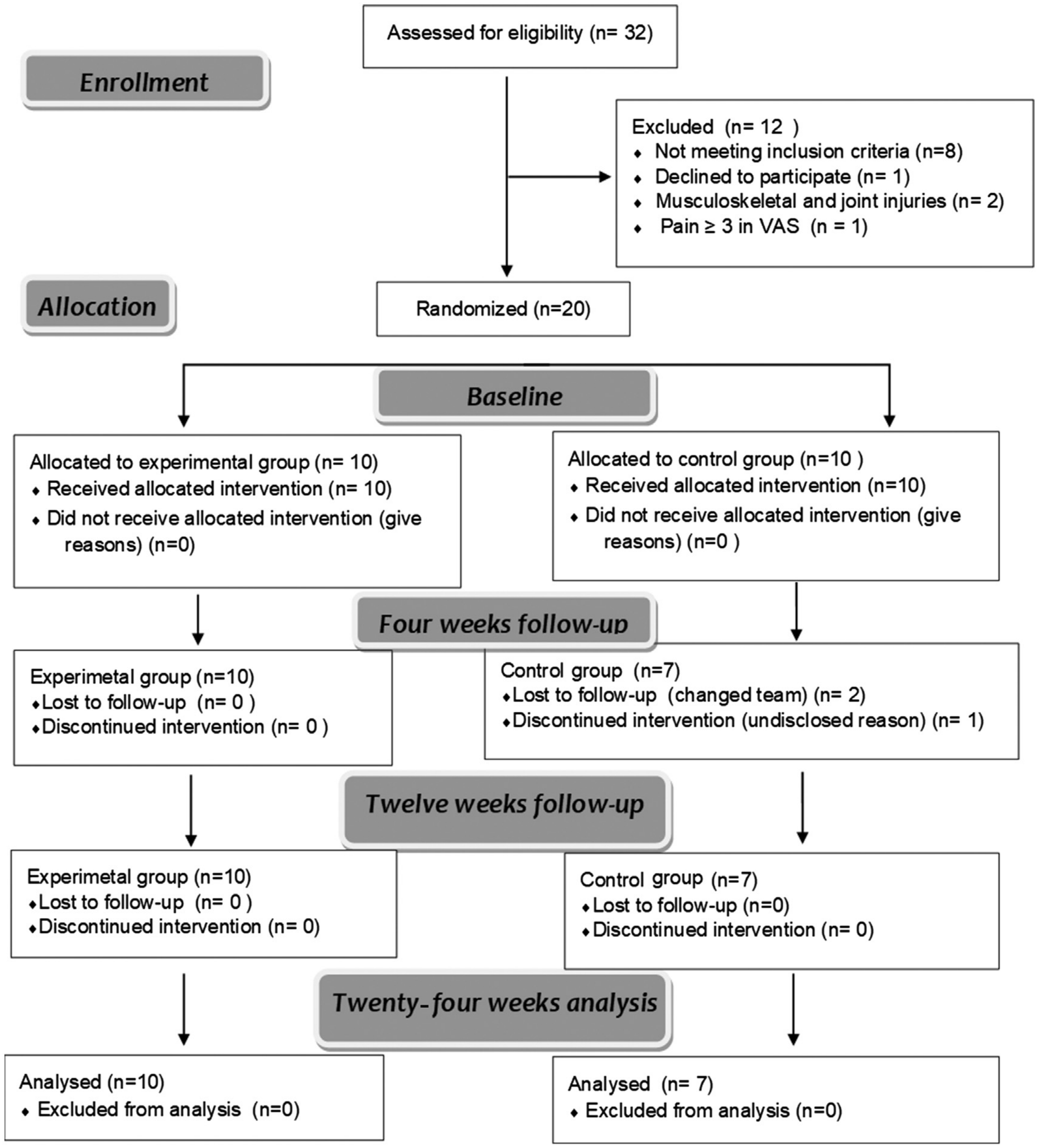

Figure 1 — Flowchart of participants.

due to LBP. It is designed for use in research (eg, as an outcome measure for clinical trials) but has also been found useful for monitoring patients in clinical practice. In this trial, as per reference, the soccer players were asked to complete the RMQ by placing a check mark next to a statement if it applied to them that day. This approach was chosen as the most appropriate for observing short-term changes in back pain or short-term changes in response to treatment. The RMQ score was calculated by adding the number of items marked. Items were not weighted. The scores, therefore, ranged from 0 (no disability) to 24 (severe disability).[37] The items were based on back statements (how affect) for daily activities, such as movement, walking, job, autonomy, and so forth.

Secondary. *Quality of life*, named as the major goal of treatment in back pain, was measured with general health questionnaire SF-12. It is a generic quality of life assessment measure that is easy to administer and understand, a reliable and valid instrument to monitor back pain patients. The SF-12 uses 2 items each to estimate scores for 4 of the 8 health concepts (physical functioning, role physical, role emotional, and mental health). Scores for the remaining 4 health concepts (bodily pain, general health, vitality, and social functioning) are estimated using 1 item each. The SF-12 also provides physical (PCS) and mental (MCS) component scores and takes approximately 2 minutes to complete. These 2 components were analyzed separately in this trial. The scores ranged from 0 to 50 for each component analyzed, with higher scores denoting better quality of life.[38]

Steps speed consists of the number of steps taken in 1 minute measured with Runtastic Performance Pedometer[39,40] (http://www.runtastic.com/en/apps/pedometer), a validated application installed on one device using Global Positioning System to track the displacement of the soccer player, calculating their speed of steps during 60 seconds. The data collected by the same device were analyzed by another assessor not involved in the study.

Sample Size Calculation

The total sample size was estimated through an a priori power analysis. The analysis was carried out using G*Power (version 3.1.9.2; Franz Faul, Universität Kiel, Kiel, Germany[41]) assuming a multivariate approach for between effects, within effects, and interactions. The following parameters were used: effect size $d = 0.5$, $\alpha = .05$, power = 0.85 with 1:1 allocation ratio (Figure 2). A total of 18 participants was needed.

Randomization

The soccer players were randomly allocated in one of 2 intervention groups in a 1:1 ratio, using a computer-generated list of numbers by the trainee squad (www.random.org), independent of the study. The allocation was concealed by using consecutively sealed, opaque envelopes. Eligible patients were allocated to the treatments. Data collection and evaluation were performed by a blinded independent assessor. The study coordinator opened the envelopes after completion of the baseline assessment. Assessors blinded to group allocation conducted the postintervention assessment 4, 12, and 24 weeks later. Participants were instructed to avoid revealing their group allocation to assessors. The Mézières method was applied by only one physiotherapist, certified in the method and coauthor of this study, who was not blinded during the intervention and not involved in data collection and the statistical process.

Statistics

The statistical analyses were carried out using IBM SPSS Statistics (version 25; IBM Corp, Armonk, NY) with a significance level set at .05. Preliminary analyses were conducted to investigate differences in age, height, and distribution of players' outcomes with LBP. All data were expressed as mean and SD. The statistician was blinded to the treatment assignment. To test the normal distribution of data, the Shapiro–Wilk test was applied before analysis. Variables were analyzed to verify whether any differences existed between the 2 groups at baseline through an a priori *t* test.

A 2 × 2 multivariate analysis of variance (ANOVA) for repeated measures was applied to verify differences in study outcomes between the control group and the experimental group. Time was considered as a within factor and treatment as a between factor with baseline time as a covariance.

GraphPad Prism (version 8; Graphpad Software Inc) statistical program software was used for the graphical elaboration. The effect size was calculated as suggested in the literature[42] using partial η^2 with .1 representing a small effect, .3 representing a moderate effect, and .5 representing a large effect.

Results

Participants

A total of 32 soccer players were screened for eligibility. Twenty satisfied all criteria, agreed to participate, and were randomly allocated into groups. A total of 3 players dropped out (2 participants changed team and 1 had an undisclosed reason/did not returned for treatment) after the baseline data assessment, leaving 10 participants in the experimental group and 7 in the control group (Figure 1).

Baseline Assessments

There was no difference in any of the demographics or outcome variables between the experimental and control groups before the intervention period ($P < .05$; Table 1).

Primary Outcomes. *Pain intensity (VAS), back flexibility (sit and reach), and back disability (RMQ).*

The repeated-measures ANOVA with baseline assessments as covariance showed statistically significant differences within groups at 4, 12, and 24 weeks of treatment for the VAS and RMQ ($P < .05$). Similarly, a statistically significant repeated-measures ANOVA was observed for the sit and reach outcome in the difference within groups in time, groups, and group × time ($P < .05$) during 24 weeks of treatment.

Multivariate analysis of covariance showed a significant difference between groups at the 12th and 24th weeks of the treatment for the VAS scale and RMQ ($P < .05$); a significant difference between the experimental and control groups was seen only at the 24th week of the treatment ($P < .05$) for the sit and reach test (Table 2).

Secondary Outcomes. *Quality of life (SF-12) with the physical and mental subscale (PCS/SF-12 and MCS/SF-12) and the steps speed (Runtastic).*

Repeated-measures ANOVA for both subscales of the quality of life (*PCS/SF-12 and MCS/SF-12)* showed a significant difference within groups in time, groups, and group × time during the 24 weeks of treatment ($P < .05$). No significant difference within groups was evident for the steps speed (Runtastic; $P > .05$).

As per the multivariate analysis of covariance, a significant difference between groups was shown for the PCS/SF-12 and MCS/SF-12 subscales and the Runtastic at the 24th week of the treatment ($P < .05$; Table 2).

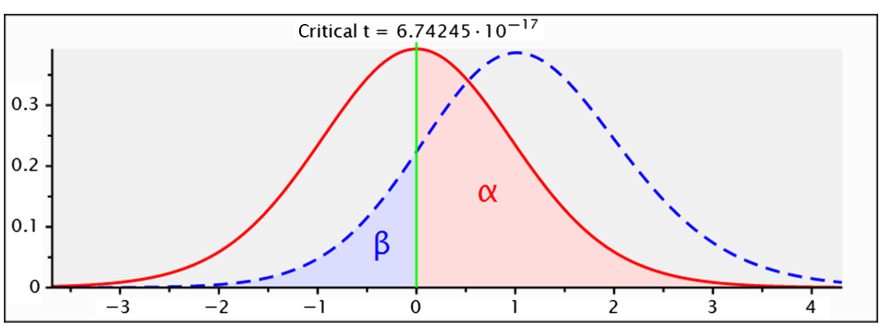

Figure 2 — A priori sample size calculation.

Table 1 Baseline Characteristics of Participants

Participants	n	Mean	SD	*t*	Sig. (2-tailed)	Mean difference
Characteristics						
Age						
Experimental	10	24.00	2.944	−1.591	.129	−2.300
Control	10	26.30	3.498			
Height						
Experimental	10	175.70	3.917	−.134	.895	−0.300
Control	10	176.00	5.888			
Primary outcomes						
Pain intensity						
VAS						
Experimental	10	3.30	1.160	−1.265	.222	−1.000
Control	10	4.30	2.214			
Back flexibility						
Sit and reach						
Experimental	10	5.20	1.033	−1.395	.180	−0.800
Control	10	6.00	1.491			
Back disability						
RMQ						
Experimental	10	3.90	1.197	−.920	.370	−0.400
Control	10	4.30	0.675			
Secondary outcomes						
Quality of life						
PCS/SF-12						
Experimental	10	35.50	5.603	−1.340	.197	−3.400
Control	10	38.90	5.744			
MCS/SF-12						
Experimental	10	40.70	4.968	−1.364	.189	−3.800
Control	10	44.50	7.276			
Steps speed						
Runtastic						
Experimental	10	167.20	10.748	−1.856	.080	−10.100
Control	10	177.30	13.442			

Abbreviations: MCS, mental component score; PCS, physical component score; RMQ, Roland-Morris questionnaire; SF-12, 12-Item Short Form Survey; VAS, visual analog scale.

Post hoc analysis between groups in the 4 periods of the study reported that the experimental group had more improvement in outcomes compared with the control group (Figure 3).

Discussion

The results of this study show, in general, a difference between groups in all outcomes at the 24th week of the treatments. The experimental group showed better results compared with the control group, which received the conventional rehabilitation protocol. Twenty soccer players with LBP were analyzed in this trial. A team has approximately 32 players. In this study region, in the second-division league (period 2016–2017), there were only 2 teams, with approximately 60 soccer players, the reason why this sample size was small.

The baseline evaluation of the soccer players was made in an upright, sitting, and supine position by the same qualified therapist who also implemented the Mézières method. The muscular contraction, postural compensation—limitations, back flexibility, muscle elasticity, hematomas, trigger points, and deep breathing—and other specific physical conditions were observed and considered for all participants.

Because of the technical, clinical, and professional characteristics of the aforementioned variables, it was impossible to record and analyze each one of them, but they were very important for the baseline evaluation, protocol, and homogeneity of the participants.

All the soccer players in the experimental group (n = 10) followed the Mézières protocol, maintaining the 3 postures indicated in Appendix A for 24 weeks.

Specifically, the first lying posture was maintained during 4 weeks of treatment in all the participants of the experimental group. The second sitting posture was maintained for 8 weeks, and the third sitting posture was maintained for the last 12 weeks of Mézières treatment in all the soccer players. The follow-up of the results of this trial was done according to the changing postures of the treatment. Therefore, all the assessments reported were analyzed in the determinate times (4–12–24 wk) to verify any improvement or significant

Table 2 Summary of the Outcomes

	Experimental group (n = 10)		Control group (n = 7)		t test			Difference between within-groups repeated measures ANOVA									Multivariate ANCOVA		
								Time			Groups			Effect group × time			Difference between groups		
	Mean	SD	Mean	SD	*t*	*P*	Mean difference	*F*	*P*	η^2	*F*	*P*	η^2	*F*	*P*	η^2	*F*	*P*	η^2
Primary outcomes																			
Pain intensity (VAS)																			
4 wk	5.00	2.357	3.86	1.345	1.151	.268	1.143	0.343	.567	0.024	0.266	.614	0.019	10.395	.006	0.426	0.894	.360	0.060
12 wk	3.10	1.729	5.29	1.976	−2.421	.029	−2.186										6.808	.021	0.327
24 wk	1.20	1.135	3.71	1.496	−3.950	.001	−2.514										24.708	.000	0.638
Back flexibility (sit and reach)																			
4 wk	6.50	0.527	7.57	0.787	−3.378	.004	−1.071	7.651	.015	0.353	7.348	.017	0.344	36.703	.000	0.724	2.558	.132	0.154
12 wk	6.90	0.994	7.29	0.488	−.943	.361	−0.386										0.072	.792	0.005
24 wk	7.90	1.969	5.86	1.215	2.427	.028	2.043										22.618	.000	0.618
Back disability (RMQ)																			
4 wk	4.00	1.333	4.43	2.070	−.521	.610	−0.429	0.550	.471	0.038	4.218	.059	0.232	63.947	.000	0.820	0.064	.804	0.005
12 wk	2.40	1.430	4.29	1.604	−2.548	.022	−1.886										6.421	.024	0.314
24 wk	1.00	0.943	5.00	1.414	−7.029	.000	−4.000										61.500	.000	0.815
Secondary outcomes																			
Quality of life (SF-12)																			
PCS																			
4 wk	37.00	5.033	40.71	5.529	−1.439	.171	−3.714	4.860	.045	0.258	5.319	.037	0.275	30.456	.000	0.685	0.350	.563	0.024
12 wk	40.90	5.744	37.71	5.559	1.140	.272	3.186										3.499	.082	0.200
24 wk	46.40	6.275	33.57	5.287	4.412	.001	12.829										204.288	.000	0.936
MCS																			
4 wk	42.30	4.270	43.71	3.402	−.727	.478	−1.414	4.784	.046	0.255	5.388	.036	0.278	33.427	.000	0.705	0.402	.536	0.028
12 wk	44.10	3.665	43.43	4.467	.340	.738	0.671										3.354	.088	0.193
24 wk	51.90	5.724	37.29	7.825	4.463	.000	14.614										92.324	.000	0.868
Steps speed (Runtastic)																			
4 wk	172.60	11.539	182.00	6.608	−1.933	.072	−9.400	1.454	.248	0.094	1.379	.260	0.090	1.577	.230	0.101	0.649	.434	0.044
12 wk	173.90	10.159	177.71	5.251	−.906	.379	−3.814										0.487	.497	0.034
24 wk	182.90	5.363	175.43	6.901	2.516	.024	7.471										14.296	.002	0.505

Abbreviations: ANOVA, analysis of variance; ANCOVA, analysis of covariance; MCS, mental component score; PCS, physical component score; RMQ, Roland-Morris questionnaire; VAS, visual analog scale.

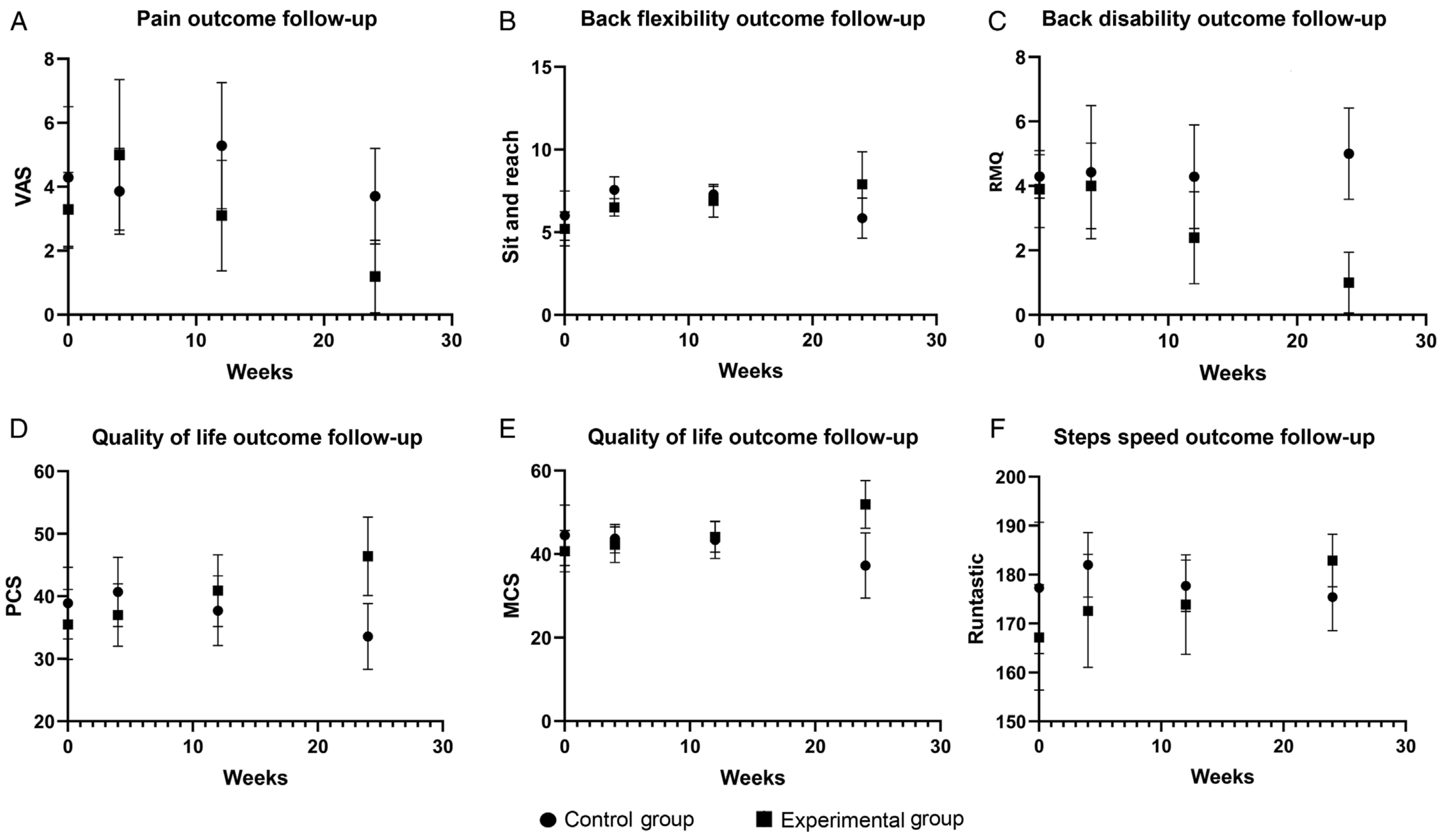

Figure 3 — GraphPad prism outcomes. Primary outcomes: (A) VAS follow-up, (B) back flexibility follow-up, and (C) back disability follow-up. Secondary outcomes: (D) PCS follow-up, (E) MCS follow-up, and (F) steps speed follow-up. MCS indicates mental component score; PCS, physical component score; RMQ, Roland-Morris questionnaire; VAS, visual analog scale.

changes of the outcomes, such as pain, function, back flexibility, quality of life, and steps speed.

Regarding the primary outcomes (pain, back flexibility, and back disability), a significant improvement was verified in the difference between means as per the experimental group, accompanied with the postural changes of the Mézières method. Specifically, improvement in the experiential group was shown in the last 8-week period in the sitting position compared with the control group, who did not present a significant improvement in the same treatment period.

The same situation presented for quality of life and steps speed as secondary outcomes in the 2 groups of the study at the same period of the treatment.

The aim of this research was to verify the Mézières method compared with a standard rehabilitation protocol for elite athletes with LBP. The results showed that Mézières method can be used as a complementary therapy in this field. Referring to the effectiveness of the manual treatments in patients with LBP with specific focus on GPR, several previous studies have addressed this subject using the same assessments.[23,29,43,44] The main methodological flaws found in the studies were the short intervention periods and a failure to describe the protocol.[20,43,44]

The GPR, as mentioned previously, is a derivation of Mézières, a method that mainly involves global stretching, breath control, and manual control by the therapist to provide proprioceptive information to the patient. Therefore, it is halfway between active techniques, such as stretching, and passive techniques, such as manual therapy. Breath control plays a significant role during the exercises and may be proposed as one of the beneficial mechanisms of the treatment.[23,40]

Regarding the Mézières method, only one study was found in the literature that implemented this treatment in elite athletes with LBP[29] and had satisfactory results.

In this trial, pain was chosen as a primary outcome because it is the main complaint of athletes with LBP. Significant results for pain in the experimental group were shown in the 12th and 24th weeks with 1.9 cm on the 10-cm pain scale. Comparing these results with the baseline data, the improvement of the experimental group consisted of a total of 2.1 cm on the 10-cm pain scale, whereas the control group had an improvement in pain of 0.59 cm on the 10-cm pain scale. Analyzing this outcome, Dagenais et al[45] believed that pain, anxiety, and depression are associated with the perception of the same event and reported that the intensity of pain can vary throughout the day, for prolonged periods, or due to physical effort. Delitto et al[46] suggested that nociceptive factors also play an important role; however, clinical interpretation cannot be based solely on anatomical factors.

Referring to back flexibility (sit and reach) as a primary outcome, the experimental group presented an improvement of 1.3 cm more in the fourth week of the treatment compared with the control group, which had, at the same time, an improvement of 1.57 cm. This situation changed during the 12 and 24 weeks of the treatment with an improvement of 0.4 cm and 1 cm for the experimental group and with a decrease of, respectively, 0.28 and 1.43 cm for the control group. Although the improvements were less than or equal to 1 cm, the differences between and within groups show a large effect size with a partial $\eta^2 > .6$.

Moreover, to our knowledge, there is no study that has assessed minimal detectable change during the sit and reach test. Therefore, although large effect sizes have been observed, this improvement may not be clinically relevant as the magnitude of change was ≤1 cm.

However, the type of stretching in the evaluated groups was different. The experimental group performed a static stretch, whereas the general group performed static, dynamic, and ballistic stretches. We believe that the positive results of the experimental group were due to the acquired elasticity of the back muscles provided by the stretching techniques of the Mézières therapy.[21,43] Static stretching may be better than dynamic stretching.[29]

Considering the back disability (RMQ) outcome, both groups after the first month of treatment had approximately the same improvement in points, but these results changed in favor of the experimental group, which had a decrease in the RMQ scale with 1.6 points at the 12th week and 1.4 points at the 24th week compared with the control group, who demonstrated a score improvement in this questionnaire (Table 2 and Figure 3C). This change could be related to the global nature of the Mézières method approach. The Mézières method treats the body as a whole, trying to understand the origin of the problem and to fix it before the problem occurs.[21,22] The origin of the problem can be understood from the soccer players' compensation postures, antalgic postures, and spontaneous positioning before and during the treatment. From the first-time evaluation of the soccer players in the supine position, it can be verified that the proprioception of the soccer player is well aligned in the therapeutic bed.

Referring to the results as per the quality-of-life outcome (SF-12), the physical (PCS) and mental (MCS) subscales were analyzed separately. In general, the 2 subscales had approximately the same results during the 12 weeks of the treatment, but the situation changed at the end of the treatment with an improvement of SF-12 in the experimental group vis-à-vis the control group (Figure 3E and 3F).

The difference between groups at the 24th week of treatment show a significant improvement for the experimental group with a large effect size (*&nltail;*$^2 = 0.5$) as per steps speed as a secondary outcome, measured with the Runtastic pedometer performance.

Furthermore, according to the European guideline, the biopsychosocial model is also recommended;[32] this is the reason why this study used the Mézières approach (ie, for the global postural rehabilitation offered). Treatment of chronic LBP is recommended to follow the standard rehabilitation protocol with a multidisciplinary approach, including not only biological factors but also the psychosocial dimension.

This study tried to homogenize the sample, so the reports of this trial can only be addressed to professional athletes. A 6-month duration of the Mézières implementation could positively affect the results of this study. Referring to Mézières, Souchard, Denys-Struyf, and Busquet, the benefits of postural treatment can be seen after sixth month of treatment.[22]

It is important to mention that the Mézières implementation used in this study did not worsen the pain of the soccer players, proving that this method has no harmful effects on the patients.

One limitation of this study is that the treatment provider and participants could not be blinded to the interventions. The patients in this study were elite athletes with a high level of training. They had moderate pain and disability, so the obtained results cannot be applied to the general population but only to particular patients.

Conclusion

The primary outcomes of the present study suggest that the Mézières therapy can be effective in the enhancement of back flexibility and reduction of athletes' back disability and back pain.

Also, secondary outcomes showed that Mézières treatment can improve the quality of life and steps speed performance in soccer players with LBP.

Practical Application

This study suggests that Mézières therapy can be a useful and valuable option to treat athletes with back pain. This noninvasive treatment is safe and can be combined easily with other rehabilitation treatments. It must be relevant to consider how crucial back pain is to athletes and the disabilities it can cause. Increasing the number of alternative therapies used to treat back pain will increase the benefits to athletes.

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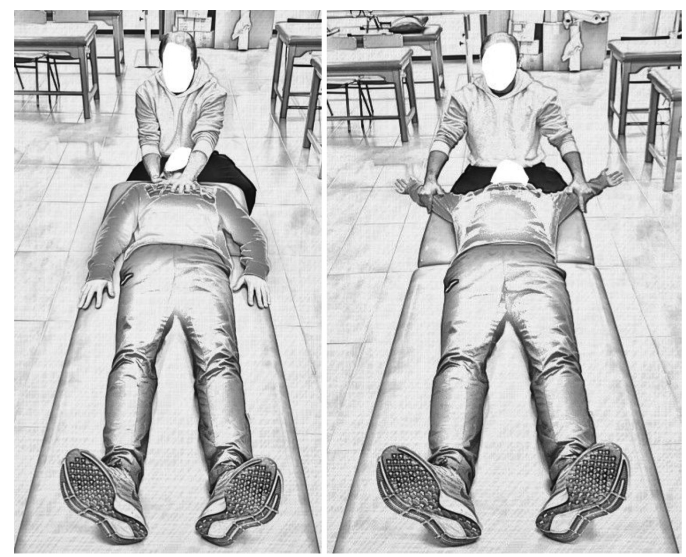
Appendix A: Treatment Protocol of Experimental Group

Treatment period	Intervention protocol in general group	Duration
Baseline physiotherapeutic evaluation	Low back muscular chain evaluation (erector spinae, transverse spinalis, interspinalis interested muscles)	10 min
	Postural evaluation of dorsal curves (3 plans)	5 min
	Back muscle extensibility measured with sit and reach test	5 min
	Palpation of hypertonic muscle groups	5 min
	Deep breathing evaluation with implication of diaphragmatic, paravertebral, and latissimus dorsi muscles	5 min
	Evaluation of abdominal muscles (in our interest: internal–external oblique, transverse, and rectus abdominis; deep abdominal muscles: psoas major, psoas minor, iliacus, quadratus lumborum)	10 min
First posture: supine position (1–4 wk)	Soccer player in supine position (neutral positioning with the therapist in craniocaudal direction and in harmony with diaphragmatic respiration)	40 min
	Therapist-guided stretch for the correction of variations in dorsal curve, correction of inspiratory thoracic block, prolonged tension of muscle chains, and with the maximum extension of the upper limbs	
Second posture; supine position (4–12 wk)	Supine position with upper limbs abducted to 120° with the maximum elongation of the latissimus dorsi, hips flexed, and arms opened	40 min
	Respiration reeducation with diaphragmatic breathing	
Third posture: sitting position (12–24 wk)	Sitting position (with legs extended in 180°, hips flexed more than 90° and arms closed)	40 min
	Deep diaphragmatic breathing	
	Therapist helps the soccer player in the maintenance of the correct position without compensation (implication of the rectus femoris and rectus abdominis muscles accompanied with stretching of the posterior muscle chain)	

Treatment period	Positions
First posture: supine position (1–4 wk)	

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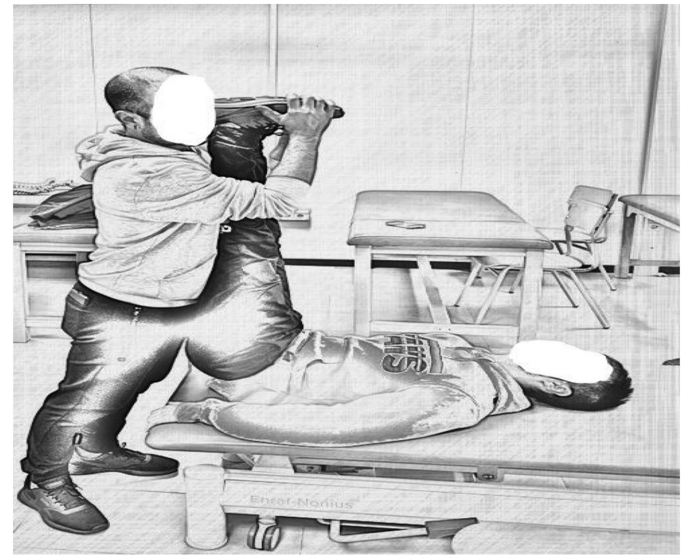
Treatment period	Positions
Second posture: supine position (4–12 wk)	
Third posture: sitting position (12–24 wk)	

Appendix B: Treatment Protocol of Control Group

Treatment period	Intervention protocol in control group	Duration
Baseline physiotherapeutic evaluation	Low back muscular chain evaluation (erector spinae, transverse spinalis, interspinalis interested muscles)	10 min
	Postural evaluation of dorsal curves (3 plans)	5 min
	Back muscle extensibility measured with sit and reach test	5 min
	Palpation of hypertonic muscle groups	5 min
	Deep breathing evaluation with implication of diaphragmatic, paravertebral, and latissimus dorsi muscles	5 min
	Evaluation of abdominal muscles (in our interest: internal–external oblique, transverse, and rectus abdominis; deep abdominal muscles: psoas major, psoas minor, iliacus, quadratus lumborum)	10 min
First exercise group: back extensor muscles treatment and spinal mobilization (1–4 wk)	Static stretching techniques in supine position: 1. Lower limbs and trunk muscles stretched with hip flexion in 90° and knee extended for 5 min (no repetitions) 2. Single knee to chest—drawing one leg to the chest stretching the lumbar region (3×30 s) 3. Double knee to chest—drawing both legs to the chest stretching the lumbar region (3×30 s) 4. PNF with resistance to the lower-extremity flexion/adduction patterns to facilitate radiation to the abdominals for functional bracing (3×30 s)	15 min
	Soft tissue therapy (treatment of the thoracolumbar fascia, massage lengthening)	15 min
	Spinal mobility in the seated position and on all fours	10 min
Second exercise group: stretching exercises (4–12 wk)	Static stretching of the posterior chain: 1. Seated calf stretch with attention of iliopsoas and back extensor muscle, placing the stick on the sole of the feet with knee extended (3×30 s) 2. Iliotibial band stretch: hip raises in supine position with knees in flexion with resting on the ground, lifting the hips off the ground and maintaining this position 3×30 s Dynamic hip flexors and psoas stretch: 3. Half kneeling position, placing one foot forward with 90° at hip and knee, keeping the torso upright and leaning slowly forward, creating tension in top of the thigh to the rear leg (3×30 s) 4. PNF at lower trunk flexion, upper trunk flexion with chopping, and lower trunk flexion with rotation (90″ with 3 repetitions)	20 min
	Rectus abdominis strengthening: 1. Abs ball crunch—seated position with a balance ball, keeping both feet on the floor, curling up and maintaining balance 3×30 s 2. Crunch—supine position on the floor with knees bent and lower limbs remaining motionless during the exercise, curling up the trunk 3×30 s	10 min
	Spinal mobility in the seated position and on all fours	10 min
Third exercise group: movement facilitation and electrotherapy (12–24 wk)	Ballistic stretching muscle groups: 1. Hamstring—leg swing exercise in standing position 3×30 s 2. Hip flexors—prone position with arms outstretched and feet flexed, kicking the foot to the contralateral arm and vice versa, repeating 10 times for each side Lumbar extensors: 3. McKenzie extension stretch in prone position by pushing the trunk up with hands against resistance (10 repetitions × 3 sets)	15 min
	Electrostimulation — Transcutaneous electrical nerve stimulation with low or high frequency TENS	15 min
	Low-level laser therapy	10 min

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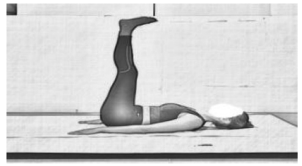
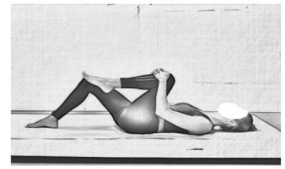
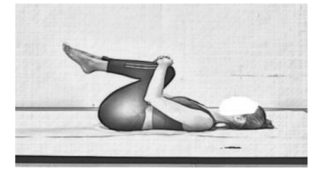
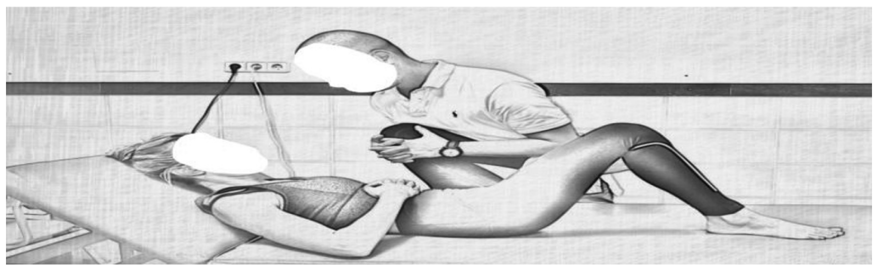
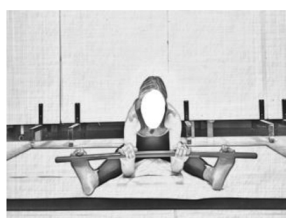
Treatment period	Stretching and PNF positions		
First exercise group: back extensor muscles treatment and spinal mobilization (1–4 wk)	1. Lower limbs and trunk muscles stretched 	2. Single knee to chest 	3. Double knee to chest 
	4. PNF with resistance to the lower-extremity flexion/adduction patterns to facilitate radiation to the abdominals for functional bracing 		
Second exercise group: stretching exercises (4–12 wk)	1. Seated calf stretch 	2. Iliotibial band stretch 	3. Half kneeling position 

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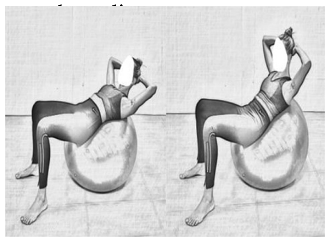
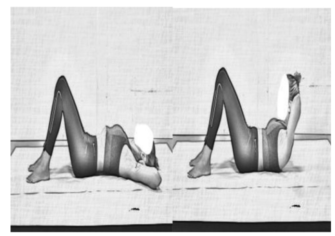
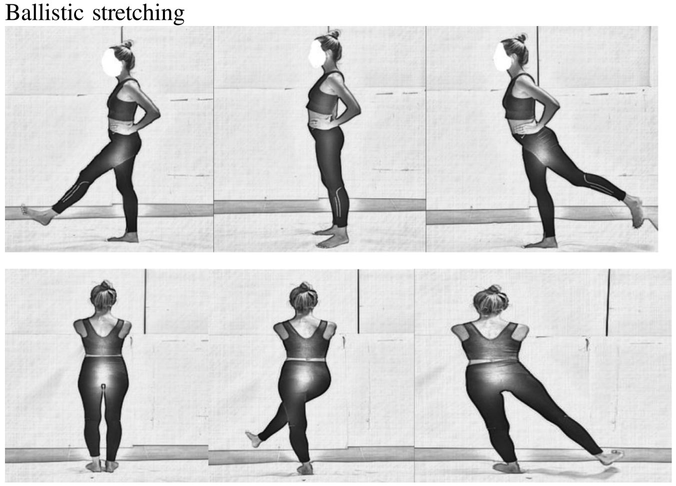
Treatment period	Stretching and PNF positions
	4. PNF at lower trunk flexion, upper trunk flexion with chopping, and lower trunk flexion with rotation 
	Rectus abdominis strengthening: 1. Abs ball  2. Crunch 
Third exercise group: movement facilitation and electrotherapy (12–24 wk)	Ballistic stretching 

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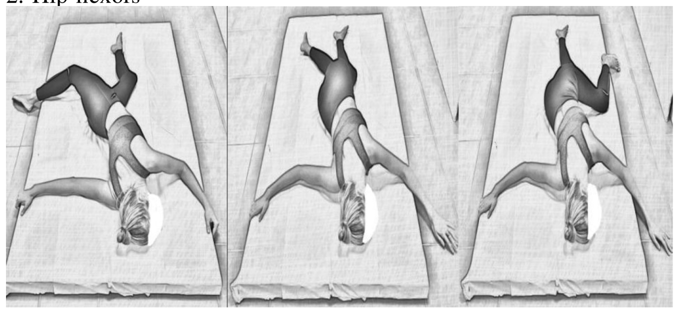
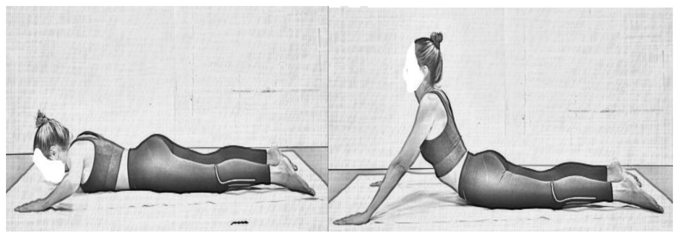
Treatment period	Stretching and PNF positions
	2. Hip flexors  Lumbar extensors: 3. McKenzie extension stretch 

Abbreviation: PNF, proprioceptive neuromuscular facilitation; TENS, transcutaneous electrical nerve stimulation. Note: The demonstration of stretching exercises was done by an athlete not included in the study.