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Comparison of the effect of eight weeks of traditional resistance training and TRX on the pain intensity of soccer players with non-specific chronic low back pain

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Abstract:

Background: Back pain is one of the most common musculoskeletal disorders. Since it is difficult for patients with back pain to bear weight, a treatment that can strengthen the muscles of the lumbar region while losing weight is of great interest. Therefore, the purpose of this study was to compare the effect of eight weeks of traditional resistance training and TRX on the pain intensity of football players with non-specific chronic back pain.

Methods: 45 elite soccer players aged 20 to 30 years with chronic back pain were purposefully selected and placed in 3 groups, TRX exercises, traditional exercises and a control group with 15 people each. Before and after the training session, pain intensity variable was evaluated by visual pain scale (VAS). In the following, the subjects of the experimental groups performed their respective exercises for 8 weeks and 3 sessions of 45 minutes each week, while during the same period, the subjects of the control group did not participate in any special exercise program and lived their daily lives. they did For the inferential analysis of the data, the statistical method of analysis of variance was used for repeated data (P = 0.05).

Results: In the intra-group comparison, a significant effect on pain intensity was observed in both traditional and TRX groups, but no significant difference was observed in the control group. The findings showed that in the intergroup comparison between the intervention groups compared to the control and between the two intervention groups, a significant difference was observed in the variables of pain intensity, so that the TRX exercise group had more effect and effect size than traditional exercises.

Conclusion: In general, the results of this research showed that the TRX training program has a significant effect in improving pain intensity compared to traditional training.

Keywords: Chronic back pain, TRX exercises, Pain, Resistance Training

Introduction:

Chronic disease is one of the most important medical problems in the world and is the main cause of human suffering and disability. Low back pain is a common problem among adults and affects 80% of people at least once in their life. Although most of these conditions improve on their own, it has been reported that people who have experienced back pain once have a 60% chance of having back

pain again [1]. Low back injuries are a common problem in young athletes, affecting 10-15% of athletes. It is not known whether athletes are at a higher risk for back pain than the general population, but research shows that young athletes, gymnasts, and wrestlers are more likely to develop back pain than people of that age [2]. The treatment of these patients included physiotherapy, painkillers, injections and increased intervertebral disc surgery and spine fusion. Based on the initial beliefs, back pain is a pathoanatomic disease (such as lumbar disc, spinal canal stenosis, cartilage and joint surface damage, fracture, etc.) and therefore its treatment should be based on a biomedical model. However, according to the available results, only 8-15% of patients with back pain have a specific pathoanatomical cause, so most of them are known as non-specific back pain. Among these people, a small but significant number receive significant health care by acquiring a chronic and debilitating condition called nonspecific chronic low back pain. Therefore, understanding the mechanisms and possible causes of recurrence of this disease has been the focus of research. Among chronic back pain, non-specific chronic back pain is the most common type [3].

Chronic low back pain may affect the risk of spine and limb injuries by altering the control of pelvic girdle motion. Pain and instability are the most common problems of patients with chronic back pain. Correcting this disease by improving coordination, flexibility, stability and muscle strength through appropriate exercises can restore the balance and proper functioning of the involved muscles and joints. The results of researchers' studies have shown that exercise therapy is better than other muscles for correcting back pain. Treatment methods are more effective. Functional training increases the ability to perform daily tasks independently. Functional training programs emphasize the use of activities that use multiple muscle groups. Some types of these exercises include competitive weight training and resistance training. Some of the benefits of exercise include: improving core muscle activation, postural control and coordination, lower and upper body strength, agility, dynamic balance and shoulder flexibility. Traditional resistance exercises such as exercises using equipment or static movements. Muscles are described.

TRX training is one of the newer methods of training that uses two rope-like handles and different goals to perform hundreds of different exercises using tension or body weight. Changing the applied force by moving and changing the body position and reducing or increasing it [4]. TRX is a portable training tool that increases strength, muscular endurance, core stability, balance and flexibility and allows you to control body position and stability in multi-level resistance, neuromuscular and balance exercises. The TRX training technique includes muscle activity in the central and lateral muscles in each exercise, and unlike traditional resistance training in which stress and training stress are applied to one muscle group, TRX allows the use of a large number of muscle groups. In addition to allowing multi-directional range of motion, TRX is an effective way to build muscle by combining strength training with aerobics. TRX is a practical exercise tool that improves fitness and performance while treating and preventing musculoskeletal injuries or disabilities. In all TRX exercises, the body must be active as a coordinated system, especially the muscles. The center is activated to maintain the desired positions. During dynamic movement in exercises. Neuromuscular coordination to coordinate these exercises is one of the key aspects of TRX exercises. TRX is one of the most popular tools for strength and resistance training today. Training with TRX equipment increases the function of proprioceptive receptors and increases tension in the central muscles, which are important for balance and stability.

Finding an effective method to correct back pain is very important, and usually people use non-invasive and non-pharmacological methods to treat it, such as exercise, movement therapy and others. Therefore, according to the studies, it seems that exercise therapy can be considered as one of the effective methods for treating chronic pain [5]. But on the one hand, there is a difference of opinion

about the effectiveness of stability exercises, and on the other hand, more information is needed about the type of patient being studied, the most effective exercises, and the optimal amount of exercises. Given the diversity of exercise therapy methods, there is still insufficient evidence on the superiority of one method. Few studies have investigated the effects of TRX training versus conventional resistance training on muscle function and pain levels in individuals with low back pain. Therefore, the researcher seeks to find the answer to this question, is there a difference between a course of TRX exercises and traditional resistance on the pain intensity of football players with non-specific chronic low back pain?

Materials and methods:

Method of this study was kind of experimental research that did in 3 level. Before testing we gave summery of our plan and we took our subjects with inclusion and exclusion criteria of investigation. On the day of the test, after the subjects completed the consent form, their background information including height, weight, age, sports history (from 2 years ago until now have played soccer), injury history, and other disease records were recorded in the data collection form. According to the entry criteria, 30 of these people were selected to participate in the research. After selecting the eligible, they are randomly divided into an experimental group and a control group. Next, the pre-test was used to assess pain intensity using a visual pain scale. Further, after eight weeks of resistance training and TRX for three sessions a week for the intervention groups, the post-test of pain intensity was performed in the conditions of the pre-test measurements and the results were analyzed statistically.

Measuring the intensity of back pain: the visual scale is a horizontal line of 10 cm, with the word "painless" at the left end and the word "most imaginable pain" at the right end. In other words, this scale is a 10 cm horizontal bar, one end of which is zero (absence of pain) and the other end is 10 (the most severe pain). Subjects are asked to mark a point on this 10 cm line according to the numbers at the two ends, which indicate the level of pain, such that zero indicates the absence of pain and ten indicates the most severe pain. Then, using a ruler, the distance from this point to the starting point of the zero side was measured, and the obtained number is considered as the patient's pain. Validity 0.70 and reliability 0.97 have been reported for this scale [6].

Resistance exercises: The type of exercises and the protocol of resistance exercises are as follows [7].

Table 1: Protocol of resistance training

Exercise	Explain
side plank	The person is lying on the side on the elbows and toes and keeps the body in one direction.
full plank	The person is placed on the elbows and toes and keeps the body in a straight line.
Bird dag	The person is on all fours, standing on one knee and wrist, and raises the opposite arm and leg and keeps it straight. The trunk is kept in one direction.

Diagonal crunch	The movement takes place in a long and lunge manner, while only the shoulder blades are separated from the ground.
Abdominal Bridge	In the archer position, the person separates the hips from the ground and places the body in a straight line. With advanced training, one leg is separated from the ground.
Hand – Heel	With full extension of the elbows and lower limbs, the athlete was placed in the vault position and placed the heels of the feet on the box. In this position, the head, pelvis and legs were in the same line.

TRX training protocol: Subjects performed TRX training for 8 weeks and every other day for three days each week. Each training session consisted of 10 minutes of general warm-up, 20-30 minutes of TRX exercises, and 10 minutes of general cooling. Before starting the training period, three training sessions were held for all subjects. 8 weeks of exercises were performed based on the method used by. In the first two weeks, due to the low speed of the movements, the intensity was lower and with 8 repetitions, and in the following weeks, following the principle of overload, the intensity level was applied by increasing the number of repetitions and changing the angle of the person with respect to the ground and the height of the band[8].

Table 2: Overload of 8 weeks

Exercise	1 week Repetition (set)	2week Repetition (set)	3week Repetition (set)	4 week Repetition (set)	5 week Repetition (set)	6 week Repetition (set)	7 week Repetition (set)	8 week Repetition (set)
Trunk rotation	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)
Bench fly	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)
rowing	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)
squat	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)
Moderate sit up	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)
Bench press	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)
Reverse rowing	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)
Arched cross	8(2)	10(2)	8(3)	10(3)	12(3)	8(4)	10(4)	12(4)

Findings:

Descriptive statistics related to weight, age, height and BMI variables are given in Table 3.

Table 3: Table of descriptive statistics of means and standard deviation

Items	Resistance training (mean±SD)	TRX (mean±SD)	Control (mean±SD)	P
Age (year)	25.13±5.72	26.12±7.10	25.82±7.15	0.70
Height (cm)	167.9±8.25	166.71±12.98	164.71±14.98	0.54
Weight (Kg)	68.36±7.1	67.54±12.43	66.54±11.43	0.76
BMI	26.20±2.41	26.21±3.67	25.11±3.87	0.68

Information about pain intensity in 3 groups is presented in Table 4. To test the difference between groups in the pre-test, one-way analysis of variance (ANOVA) was used. The results of the test did not show any significant difference between the groups. Also, to test the difference in the intra-group mean of the post-test compared to the pre-test, the paired t-test was used. Based on the results of this trial, the resistance training and TRX training program had a significant effect on the pain intensity of the subjects compared to the pre-trial period, which confirmed the effectiveness of the second intervention group It showed the effect in reducing pain intensity.

Table 4: ANOVA analysis test table for the investigated variables

Items	Group	Pre-test (Mean ± SD)	Post- test (Mean ± SD)	Within deference	t	P
Pain intensity (0-100)	Resistance	60.51±4.32	30.61±12.45	30.25	0.06	0.001*
	TRX	61.22±3.53	15.81±6.88	47.01	0.08	0.001*
	Control	60.76±4.12	60.52±10.11	0.31	3.10	0/86

*= significant different

To investigate the difference between the groups before and after the pain test after resistance training and TRX, one-way tests and repeated measurements were used. The results showed that the observed matrices related to pain were similar, there were no significant differences ($p \geq 0.05$), so the covariance homogeneity condition is established and this test can be used in the final analysis of pain data (Table 5). Also, the results of Lon's test showed that there is a difference between groups in errors. On the other hand, the results of Mochli's sphericity test showed that the covariate conditions are met. Considering the importance of the interaction between time and group, it is assumed that the current situation depends on the group, in other words, the change of pain over time was not the same in the three groups (Table 5).

Table 5: The results of the variance test with repeated measurements for the pain intensity variable

Items	**Time * group**		**Group**		**Time**		**Leven test**		**M box**
	P	F	P	F	P	F	pre	post	**P**
Pain intensity	0.001	85.13	0.001	69.58	0.001	114.25	0.89	0.58	**0.75**

After the results of the difference test were significant, Bonferroni's post hoc test was used to check the difference between the groups. The results of this test are given in Table 6. According to the results of this test, the resistance training program and TRX had a significant effect on reducing the pain level of the subjects compared to the control group. Therefore, the null hypothesis is rejected and the existence of differences is confirmed. Also, according to these results, a significant difference was observed between the two intervention groups, which means that the TRX training program was more effective in reducing the subjects' pain level than the resistance training program.

Table 6: Bonferroni's post hoc test results to investigate the differences between groups

Items		Resistance	TRX	Control
Pain intensity	Resistance	-	0.001*	0.001*
	TRX	0.001*	-	0.001*
	Control	0.001*	0.001*	-

*= significant different

Discussion

One of the main objectives of this study was to compare the effect of eight weeks of TRX training and traditional resistance training on back pain in female soccer players. As mentioned before, the results showed that there is a significant difference in the amount of pain of football players with back pain after applying TRX and traditional resistance exercises between the 3 control and training groups. So that pain after TRX exercises and resistance has improved compared to the control group. In the intergroup comparison between the intervention groups, a significant difference was observed, so that the TRX training group had a greater effect and effect size than traditional resistance training in improving the above variables.

Suspended core stability exercises are a method for treating back pain that is specifically used in anti-gravity positions such as exercising in water, and these people can start exercising more easily using this method. These exercises increase the stability of the back in people with back pain by reducing the weight force exerted by gravity on the spine. The results obtained were consistent with the results of Yu et al.'s (2012) research under the title of the effect of central stability exercises using a suspended cable on people's pain and muscle strength [9]. They stated that both suspended and floor-based central stability exercises were effective in reducing pain in people with chronic low back pain, but suspended exercises were more effective. According to them, the reason for this is that central stability exercises restore the function of deep and broad back muscles, thus improving body posture. On the other hand, Kim et al. (2013) during a study that examined the effect of Neurak suspension exercises on posture balance and muscle response pattern in people with chronic back pain, showed that the amount of pain decreased significantly in both groups, but the exercises Suspended central stabilization is more effective in reducing pain than conventional physical therapy exercises [10]. The reason for this is that the exercises reduce the amount of load applied on the spine and reduce the transfer of stimulation to the ligaments and joint cavity, which are tissues sensitive to pain. Also, in this regard, other researches such as Yu et al. (2015), Chu et al. (2006) and Su et al. (2013) confirm the results of the current research on the effect of suspended exercises on reducing the pain intensity of people with back pain. [9, 11, 12] In another research, in a systematic review, they stated that suspension exercises were not effective in reducing the pain intensity of people with chronic back pain, and this could be due to the difference in the nature of the programs. and the exercise methods and measurement methods used in the studies reviewed in this research. For example, the intensity or duration of the exercise period may not have been sufficient to reduce the pain of people with chronic back pain.

The reduction of pain after exercises can be due to the reduction of transmission stimulation to pain-sensitive tissues such as ligaments and joint capsules, which occurs through the reduction of the load applied to the spine, following the increase in the function of the muscles in the central region of the body. The one of the study limitation, we didn’t have control on sociological level, nutrient and physical activity.

Conclusion

In the intra-group comparison, a significant effect on pain intensity was observed in both traditional and TRX groups, but no significant difference was observed in the control group. The findings showed that, in the intergroup comparison between the intervention groups compared to the control and between the two intervention groups, a significant difference in pain intensity was observed, so that the TRX training group had a greater effect and effect size than the traditional training. We suggest you can use these exercises and our investigation protocol in rehabilitation program for back pain.

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Conflicts of interest

There are no conflicts of interest, according to the authors.

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