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Original article

EFFECT OF TRX SUSPENSION TRAINING AS A PREVENTION PROGRAM TO AVOID THE SHOULDER PAIN FOR SWIMMERS

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Abstract

Aim. The incidence of swimmer's shoulder has been reported to be as low as 3% and as high as 67%. When specifically defined as "significant shoulder pain that interferes with training or progress in training," an incidence of 35% has been reported in elite and senior level swimmers. The purpose of this study was to investigate the effect of TRX Suspension training as a prevention program to avoid the shoulder pain for youth swimmers.

Methods. The sample comprised random from Ajman club. (10) Swimmers, The subjects participated TRX suspension training program Three- times weekly. To eight weeks. The subjects did not suffer from any shoulder injury before. The homogeneity in height, weight and chronological age.

Results. Statistical analyses showed that the improvement significantly higher between the pre and post measurements for the experimental group in all physical variables.

Conclusions. Finally, Swimmers shoulder is a condition that may be prevented with TRX suspension training and adequate preseason screening that can identify impairments and training errors that may lead to symptoms. If a swimmer does become symptomatic during the season, the physical therapist should identify the most likely impairments or training errors and rule out any significant tissue pathology that would warrant a referral to an orthopedic surgeon. These results have to be taken into account by trainers in order to better understand and apply it.

Keywords: TRX Suspension training, shoulder pain, swimming.

Introduction

In 2009, Fabio Martella MMA coaching wrote the first TRX technical manual in Italy. Another alternative is the aeroSling ELITE made in Germany. This "Suspended Pulley Trainer" also contains a pulley system. (Amr, 2008) The Hook Isometrics/Suspension Trainer by Sierra Exercise Equipment enables the user to use it for either suspension training or isometrics training. In 2010 Zita Alves, a Personal Trainer and Fitness Entrepreneur developed the Ztrainer Suspension Fitness System. Evolution has continued with newer suspension bodyweight trainers offering wider cambered workouts, such as the CoreX Suspension Trainer, which designed to place less stress on joints and tendons than traditional suspension bodyweight trainer.

Suspension Training (ST) is a relatively new mode of exercise that uses the exerciser's own body weight as resistance. Suspension training employs an assortment of upper and lower body exercises, which all require the individual to maintain balance while performing the various exercises (Dudgeon, et al., 2011).

Suspension training refers to an approach to strength training that uses a system of ropes and webbing called a "suspension trainer" to allow users to work against their own body weight.

The field of suspension training is a form of resistance training that includes bodyweight exercises in which a variety of multi-planar, compound exercise movements could be performed. These done with the aim of developing strength, balance, flexibility, and joint stability simultaneously. (Amr 2008) Suspension training develops physical strength while using functional movements and dynamic positions.

TRX Suspension Training is a new sling training for an intense full-body workout in a short time. By the versatile exercises, not only power, but also coordination, stability and mobility can work effectively. They also bend sport typical injuries such as ligament and cruciate ligament still useful. Also for the comprehensive and effective strengthening of the core muscles, that Sling training is ideally suited.

As an aid is a noose that you simply fastened to the ceiling or other strong subject. This uses the exerciser by leaning it supports or mounts during the exercises. Using the own body strength allows the spine to stabilize in all body positions and positions and consolidate. Familiar exercises like lying or side support, thanks to the free hanging loops for unfamiliar challenge. (Carey, 2013)

Since the sling training the majority of the

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muscles and even the "hidden" groups of muscles and ligaments of the body demands that one rarely takes up otherwise, it is estimated in therapy, fitness as well in competitive sports field as an effective training method. Likewise, the but stabilization training be used after injuries to prepare the muscles and ligaments back on the sporting burden for rehabilitation. Many physical therapists use the Sling training already for their patients. (Abelew, 2001)

Swimmer's shoulder is the term used to describe the problem of shoulder pain in the competitive swimmer. Swimming is an unusual sport in that the shoulders and upper extremities are used for locomotion, while at the same time requiring above average shoulder flexibility and range of motion (ROM) for maximal efficiency. This is often associated with an undesirable increase in joint laxity. Furthermore, it is performed in a fluid medium, which offers more resistance to movement than air. This combination of unnatural demands can lead to a spectrum of overuse injuries seen in the swimmer's shoulder, the most common of which is rotator cuff tendinitis.

Shoulder pain is a common complaint of swimmers, regardless of age or level of play. Proper technique in swimming requires a large amount of motion in the shoulder, which comes at the expense of stability. The soft tissue structures around the shoulder take the brunt of the force if there is a weakness in the body, poor posture, problems with mechanics, or any combination of these. Shoulder injury prevention programs address the common causes of shoulder pain including correcting poor posture and creating a stable base of support in the shoulder girdle and core. (Shapiro et al., 2001)

Shoulder strap is of a complex installation composed of muscles, ligaments, joints, bones, and this installation is designed to be a certain way and specific infection in any part of these components mean the inability to complete the movements carried out and the required efficiency.

Moreover, the components of this installation tissue is characterized by relative independence in balance from other parts of the body and then exposing it to injury significantly may turn into a chronic injury if repeated or neglected treated.

The shoulder girdle is made up of 3 bones (the scapula, clavicle, and proximal humerus), 2 joints (the glenohumeral and acromioclavicular joints), and numerous ligaments, muscles, and tendons. The subacromial bursa overlies the rotator cuff and can provide it with some mechanical

protection from the bony acromion above in the face of impingement. (Swanik, et al., 2002)

The key ligaments are the glenohumeral ligaments (inferior, middle, superior), which are thickened regions of the joint capsule, of which the inferior glenohumeral ligament is most important. Their role is to help stabilize the glenohumeral joint, in support of the rotator cuff muscles.

The swimming depends on the arms movements, especially detailed shoulder muscles, which makes the shoulder prone to many injuries because this detailed and wide movement so it is under pressure motor resulting from the large number of performance art movements constantly. In addition, the composition of the shoulder joint, which consists of four separate joints they must work together and simultaneously a.

- Glenohumeral
- AcromioClavicular
- Sternoclavicular
- Scapulothoracic

In addition to the lack of shoulder joint muscle underneath to support

A shoulder strap and is made up of a group of muscles, and these muscles are responsible for all movements by the shoulder girdle by sharing systolic and diastolic among them a.

A - Front muscle group.

- Pectoralis Major
- Pectoralis Minor
- Subclavius
- Serratus Aterior
- Coracabrachialis
- Deltoib
- Biceps

B - Back muscle group.

- Supra Spinatus
- Infre Spinatus
- Subscapularis
- Levator Sacpulae
- Rhomboideus Mojorand Minor
- TeraMajor
- Teres Minor
- Trapezius
- LatismusDorsi
- Triceps

Finally, the trapezius, levator scapulae, rhomboids, and serratus anterior muscles stabilize and position the scapula and shoulder girdle, and are therefore very important to the swimming stroke. Without a stable platform from which to work the shoulder and arm cannot function efficiently. Fortunately, they also are only occasionally the source of significant injury in the swimmer.

The incidence of swimmer's shoulder has been reported to be as low as 3% and as high as

67%. When specifically defined as "significant shoulder pain that interferes with training or progress in training," an incidence of 35% has been reported in elite and senior level swimmers. (Carey, 2013)

The Swimming Injury Prevention Program developed specifically for the shoulders of the swimming athlete to create a better balance between the core and the rotator cuff. This balance helps reduce the rate and severity of shoulder injuries due to repetitive overhead movements. The exercises and activities are designed to create a more dynamically sound shoulder and lay the groundwork for sports-specific skill development.

More often than not stroke technique and muscle imbalance will be the cause of injuries with rotator cuff tendinitis being the most common. Although not an exact diagnosis sufferers should look to seek further medical guidance from practitioners well versed in the mechanics of swimming. Because the shoulders and upper extremities help propel the body in water, any small biomechanical problems can often accentuate the issue.

Symptoms of Swimmer's Shoulder can include:

- Pain that gradually increases while swimming.
- Pain during periods of rest.
- Overtime the shoulder may become painful to touch and aggravated during sleep.

Interesting Fact: The competitive swimmer can perform as much as 16,000 shoulder revolutions in a week while training.



TRX Suspension training Program is offered 2 days per week for 8 weeks. All participants will perform the TRX exercises to achieve these goals:

- Increase shoulder functional range of motion
- Improve static and dynamic posture
- Strengthen the rotator cuff and shoulder stabilizing muscles in functional patterns
- Improve core stability

The purpose

Participants

The sample comprised random from Ajman club. (10) Swimmers, The subjects participated TRX suspension training program Three- times weekly. To eight weeks. The subjects did not suffer from any shoulder injury before. The homogeneity in height, weight and chronological age will show in table (1)

Reasons for selecting sample.

A - swimmers on training attendance

B - Parents agree

C - Regularity in the proposed training program

C - Administration approval from Sports Club to conduct the search experience on swimmers

Training protocol:

The foundation for establishing a prevention or treatment plan for the swimmer's shoulder is having a clear understanding of the impairments, underlying tissue pathologies, and resultant functional limitations. Treatment and prevention of swimmer's shoulder focuses on addressing impairments and the training errors of overuse, misuse, or abuse as described earlier in this chapter. Achieving functional goals also requires knowledge of swimming mechanics and training techniques, as well as the stress placed on the shoulder during swimming. This knowledge will guide the physical therapist to choose exercises that place demands on the shoulder similar to those encountered with a specific sport or position.

- Utilize the core to initiate motion to reduce stress on the shoulder

Testing Procedures

Static strength test (BS)

A back dynamometer was used to measure the static leg strength. The subjects stood on the dynamometer platform and crouched to the desired leg bend position, while strapped around the waist to the dynamometer. At a prescribed time they exerted a maximum force straight upward by



extending their legs. They kept their backs straight, head erect and chest high. 3 trials were allowed to the subjects and the best score was taken. Subjects had a rest between the trials

Active Chest Flexibility test

Preparation

Stand or sit. Position bent arms up to sides; elbows bent shoulder height with wrists above elbows.

Execution

Pull elbows back behind shoulders as far as possible.

Measurement

Elbows should be able to freely travel behind shoulders symmetrically. The distance elbows travel behind shoulders or range of motion is noted.

Comments

Elbows must be kept at shoulder height during attempt for consistent assessment protocol. A mirror may help monitor proper form and assist in a more accurate assessment. Note any pain or discomfort during movement.

Passive Chest Flexibility

Preparation

Stand or sit. Position bent arms up to sides; elbows bent shoulder height with wrists above elbows. Administrator stands behind subject and grasps subject's arms near both elbows.

Execution

Administrator gently pulls elbows back until tightness is felt or subject expresses slight discomfort.

Measurement

Elbows should be able to freely travel behind shoulders symmetrically. The distance elbows travel behind shoulders or range of motion is noted.

Comments

Administrator must keep elbows at shoulder height for consistent assessment protocol. Note any pain or discomfort during movement.

Shoulder Mobility (open hands)

Preparation

Raise one arm, bend elbow, and reach down across back, with palm facing upper back. Position opposite arm down behind back and reach up across back with back of hand against back.

Execution

With fingers extended, try to cross fingers, upper hand over lower hand. Repeat with arms in opposite position.

Measurement

Measure distance from fingertip to fingertip. If fingers overlap, score as a plus. If fingers fail to meet, score as a minus.

Comments

Many individuals are more flexible on one side compared to the other side. Note any pain or discomfort during movement.

Seated Medicine Ball Throw (SMBT):

The subject stands with their back to a wall, on a mat facing the area to which the ball is to be thrown, and with the feet extended and slightly apart. The ball is held with the hands (two hands) on the side and slightly behind the center. The ball is brought to the chest, and then thrown vigorously out as far as possible. The back should remain in contact with the wall at all times. Three attempts are allowed. The distance from the wall to where the ball lands are recorded. The measurement is recorded to the nearest 10 cm. The best result of three throws is used.

Statistical analysis

All statistical analyses calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Differences between two groups were reported as mean difference \pm 95% confidence intervals (meandiff \pm 95% CI). Student's t-test for dependent samples was used to determine the differences in physical parameters between the pre and posttests. The $p < 0.05$ was considered as statistically significant.

Results

Table 1. Age, Anthropometric Characteristics and physical variables of the Group (Mean \pm SD)

Variables	Mean	Standard Deviation	coefficient of skewness
Age (years)	20.55	1.65	0.34
Height (cm)	180.76	2.54	0.45
Weight (kg)	77.44	3.28	1.11

Table 1 shows the age, anthropometric characteristics and physical variables of the subjects. There were no significant differences were observed in the anthropometric characteristics for the subjects.



Table 2. Mean \pm SD and "T" sign. Between the pre and posttests for experimental group in physical variables

Variables	Experimental group		T sign.
	Before	After	
Static strength test	88.12 \pm 3.44	91.22 \pm 4.28	Sign.
Passive Chest Flexibility	3.21 \pm 0.26	3.52 \pm 0.41	Sign.
Active Chest Flexibility test	3.15 \pm 0.65	3.38 \pm 0.39	Sign.
Shoulder Mobility	3.32 \pm 0.43	3.66 \pm 0.22	Sign.
Seated Medicine Ball Throw	6.41 \pm 0.33	6.52 \pm 0.39	Sign.

The t-test showed statistically significant differences between the pre and post measurements for the experimental groups in all physical variables.

Discussion

Based on the results of this study the improvement attributed to the TRX suspension training program which improvement all physical variables specially strength and flexibility of shoulder

According to (Medhat 2000) Strength and power are required for maximal propulsion, while flexibility is required for an efficient and faster recovery. Increased shoulder flexibility and ROM are beneficial to all strokes but can result in increased laxity of the glenohumeral joint capsule and ligaments, the static stabilizers of the shoulder. This laxity must then be compensated for by a stronger rotator cuff, to keep the humeral head centered in the glenoid socket during stroke activity, a requirement for efficient stroke work as well as to avoid injury to the labrum and cuff. (Swanik, et al., 2002)

TRX is a system of levers between the gravity and body weight, perfect for anyone because the level of resistance and difficulty may be controlled. Depending on the tilting angle, the level of stressing the muscles directly involved, but also the abdominal one, which makes the movement balance effort, is modified. Nothing happens without the strong engagement of the abdomen, its contractions being involuntary. Unlike standard trainings, which allow the stress of a muscle group, TRX allows the use of a larger number of muscle groups simultaneously as well as a larger spectrum of multi layering movements. By these exercises, you can develop at the same time:

- Strength • Balance • Flexibility

Ever since TRX suspension training took the fitness world by storm, we've been rather obsessed with its ability to whip anyone, not just Navy SEALs, into shape. Using the suspension of two straps, TRX is an effective way to build muscle while combining cardio with strength training. Although it's a fairly simple concept, there is still a lot to know about the core-powered workout. Depending on the intensity and volume of the exercises, TRX trainings can be:

- Cardio • Strength • Intervals

TRX SUSPENSION TRAINING helps the resistance of the body and body shaping, without

swelling the muscles, but only shaping them; it develops the muscle resistance, the activity of profound muscles, the posture muscles and joints mobility; it can be a good means of recovery for those with joints and back problems. With TRX, you have the opportunity to be creative, to develop your own exercises depending on the level of training, increasing gradually the difficulty and complexity of exercises, observing the basic principles:

- From easy to difficult • from simple to complex • from known to unknown (Vom Hofe, 1995)

Suspension training is an excellent way to improve any muscle imbalances you may have. This is primarily because of the amount of balance you must have to perform any of these exercise. Because of the constant instability, your body will perform as single unit to maintain the necessary balance.

Studying the shoulder joint injuries such as (Abelew, 2001; Ahmed 1996; Medhat 2000; Mohammed 2001; Nabil, Essam, 1981; Samia, 2002) through informed researcher at the national Information network noticed that the spine and the shoulder joint injuries suffered by many swimmers as a result of excess voltage accumulated on Knuckle for long periods, causing an inflammation of the lumbar muscle in the synovial sac lining of the shoulder joint PeriArthritis. Which leads to increase the thickness of the membrane lining of the joint, and thus lead to restricted movement in all directions' unlikely swimmer training for long periods. From here came the idea of research, especially since there are many ways to treat, but the researcher noted the scarcity of studies that focused on the preventive side, did the researcher found the study focused on an increase flexibility and strengthen muscles working on the spine and the shoulder joint to the swimmers to the upper levels. highlight the problem of the research, which revolves around the impact of functional exercises tout on muscle strengthening and flexibility of working shoulder joint to reduce the incidence of the swimmers.



Conclusion

Swimmers shoulder is a condition that may be prevented with TRX suspension training and adequate pre-season screening that can identify impairments and training errors that may lead to symptoms. If a swimmer does become symptomatic during the season, the physical therapist should identify the most likely impairments or training errors and rule out any significant tissue pathology that would warrant a referral to an orthopedic surgeon.

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