TRX - AN ALTERNATIVE SYSTEM FOR HANDBALL PHYSICAL TRAINING

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Abstract
The purpose of this study is to determine to what extent TRX training system (suspension training) can improve physical fitness, muscle strength, flexibility, balance and joint mobility. It also wants to find out to what extent it can eliminate or reduce the risk of injury during training period and beyond. In this study were included two athletes, handball players, who have followed for 2 months a training program in which it has been included hat was included the TRX training system.The results showed that this method can also be used to improve handball players' physical condition, their performance on the handball competition.
Key words*: TRX, suspension training, fitness, sports performance.*

INTRODUCTION

The TRX was the brainchild of a Navy Seal, born out of necessity for keeping in shape during deployment. The principles are simple: hang it up (you can do this at home using a secure bracket), grab the stirrups and work your body against gravity to build muscle and burn fat. The instability caused by the suspension develops serious strength that's very hard to replicate with regular weights.It was invented by the U.S. Navy Special Forces in 2002-2003. In 2005-2006 came out on a large market proving super efficient.

Randy Hetrick and his companions from the elite troops of the U.S. Navy needed a way to train in conditions that do not have access to traditional fitness equipment. The TRX has emerged as the answer. In the beginning it was a couple of parachute straps sewn by hand. On the following weeks and months after the TRX creation, Hetrick and his comrades quickly developed a series of exercises specifically designed to exploit this unique kind of training. Thus, in 2006, Hetrick and his companions founded a new and original kind of training: Suspended Training.

The TRX training system makes use of a very simple device which can be set anywhere, is easy to transport and you can perform virtually endless number of exercises.You can also instantly change the difficulty level by adjusting body position and exercise programs are safe and effective for people with any fitness level.

The TRX is the new program in terms of Group Training and Personal Training. This class involves all muscles of the body, being suspended and using the weight of the body in different planes of inclination. The TRX Suspension Training allows different types of workout: Interval Training, Strength and Cardio. Unlike traditional programs, TRX workouts are recommended in terms of recovery for those who have problems with their joints or back.

This type of training is suitable for anyone, because you can control the resistance and difficulty. It is a perfect exercise program for rehabilitation and for intensive physical condition development.Unlike standard workouts that allow working out one muscle, which can lead to risk of injury or muscle imbalances, The TRX Suspension Training allows a wider range of movements and training simultaneously groups of muscle (Figure 1-5).

Benefits of the TRX training:

- Train all body muscles
- Develops muscle strength;
- It is a good cardio workout;
- Increases flexibility, balance and joint mobility;
- Reduces risk of injury;
- Influences athletic performance

Figure 1. Standing facing the TRX

Figure 2. Standing back to the TRX

Figure 3. Lateral standing to the TRX

Figure 4. Squatting on the ground palms and feet suspended in the TRX

Figure 5. Lying with your feet suspended in the TRX

Figure 6. Side Stand with feet suspended in the TRX

MATERIALS AND METHODS

The TRX training method was tested on high performance athletes, football players, bodybuilders, gymnasts, etc, having a beneficial impact on their performance, but also in terms of improving their physical condition. Until now, this method has not been tested on handball players. This study proves that TRX workout system has a benefic influence regarding handball players' physical fitness and their sports performance.

The research methods included in this study were: literature review, discussions with specialists, testing method, experimental method, the method of graphical representation, etc.

In this study were included two students from Stefan cel Mare University of Suceava, from Physical Education and Sport Faculty, handball players who were trained with The TRX exercises for two months, three times a week (Table 1).

Table 1. Subjects included in this study

No.	Name and prename	Age	Occupation
1	DUMITRAS RAZVAN	23	Student, handball player
2	TIGANASU IONUT COSMIN	23	Student, handball player

RESULTS AND CONCLUSIONS

The obtained results at the initial and final tests were introduced into a table and then graphically represented. Subjects had a higher development in terms of the measured parameters comparing the initial and final results.

The performance progressive increase can be observed by comparing the initial results with the intermediary and the final one (Table 2-3).

Table 2. The results obtained by the athlete Dumitras Razvan on the 23 tests

Razvan Dumitras								
1	Motor action / type of request	Date						
		18.01.2013	25.01.2013	01.02.2013	06.02.2013	15.02.2013	22.02.2013	28.02.2013
2	Squats	18	16	25	24	24	26	26
3	Squats with right foot (left foot)	16	16	20	24	20	24	21
4	Squats with left foot (right foot stretched)	15	15	19	22	19	23	21
5	Starting on the wrong foot sprint	15	16	19	20	23	25	22
6	Start the sprint with the right foot	16	16	17	21	22	25	22
7	Sprint starting on the wrong foot with separation / Bounce off right foot	15	17	20	18	21	23	22
8	Sprinter starting with the right with separation / bounce from the left foot	17	14	18	20	22	23	21
9	Lying on his back with knees stretched raising and lowering the legs	17	16	23	19	20	26	24
10	Lying on your back with knees bent raising and lowering the leg	17	18	17	17	20	21	26
11	Exercise for the back with both hands	18	18	22	23	23	26	24
12	Exercise for back left arm	14	12	13	14	18	19	18
13	Back exercise straight arm	14	14	14	15	16	19	18
14	Pushups	14	15	17	17	18	20	22
15	Pushups with leg support	13	13	17	20	20	20	22
16	T exercises for deltoid muscles	13	11	13	15	18	19	19
17	Y exercises deltoids muscles	12	9	13	17	18	19	20
18	Rolling ahead the stand	13	12	14	15	18	22	26
19	Rolling ahead of the knee	14	12	14	13	16	19	23
20	Suspended, standing on the elbows	30s	30s	30s	30s	30s	30s	30s
21	Lateral suspended, standing on the side	30s	30s	30s	30s	30s	30s	30s
22	Crunches	17	24	30	25	30	30	31
23	Side crunches	16	20	17	20	22	25	21

Table 3. The results obtained by the athlete Tiganasu Ionut Cosmin on the 23 tests

Tiganasu Ionut Cosmin								
1	Motor action / type of request	Date						
		18.01.2013	25.01.2013	01.02.2013	06.02.2013	15.02.2013	22.02.2013	28.02.2013
2	Squats	19	22	24	23	25	25	29
3	Squats with right foot (left foot)	15	19	19	20	24	24	25
4	Squats with left foot (right foot stretched)	18	20	20	19	23	23	25
5	Starting on the wrong foot sprint	14	18	20	23	24	25	25
6	Start the sprint with the right foot	15	19	21	22	25	22	25
7	Sprint starting on the wrong foot with separation / Bounce off right foot	16	21	20	21	22	22	27
8	Sprinter starting with the right with separation / bounce from the left foot	17	19	19	22	22	22	24
9	Lying on his back with knees stretched raising and lowering the legs	16	19	23	24	26	26	21
10	Lying on your back with knees bent raising and lowering the leg	11	18	19	20	19	19	26
11	Exercise for the back with both hands	14	20	23	22	26	25	27
12	Exercise for back left arm	12	17	20	18	20	20	24
13	Back exercise straight arm	12	17	19	18	20	20	23
14	Pushups	13	17	18	21	22	21	25
15	Pushups with leg support	15	18	18	20	20	20	23
16	T exercises for deltoid muscles	5	16	19	19	19	19	22
17	Y exercises deltoids muscles	6	17	18	18	19	19	23
18	Rolling ahead the stand	9	14	16	18	19	19	30
19	Rolling ahead of the knee	9	14	17	17	19	19	23
20	Suspended, standing on the elbows	30s	30s	30s	30s	30s	30s	30s
21	Lateral suspended, standing on the side	20s	30s	30s	30s	30s	30s	30s
22	Crunches	13	19	27	32	32	31	37
23	Side crunches	12	16	16	22	25	25	27

On the represented graph, we selected some tests relevant to determining the evolution of the measured parameters in which we can observe a performance improvement of their accomplishment (Figure 7-11).

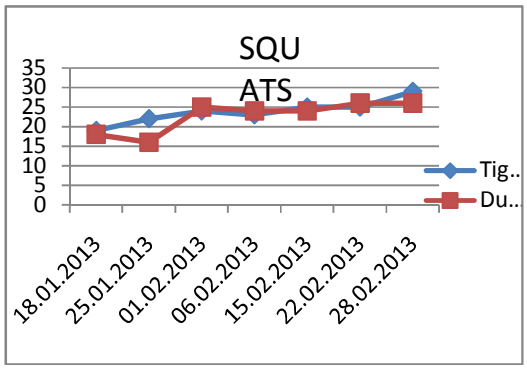

Figure7. Squats

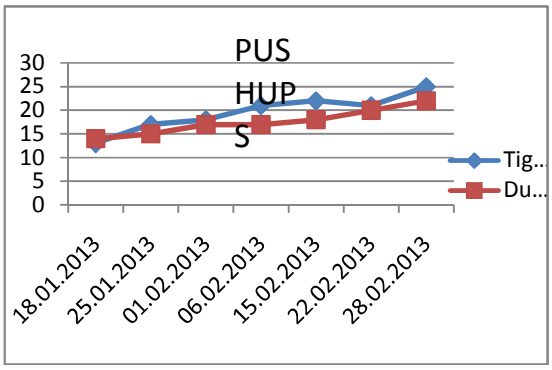

Figure 8. Pushups

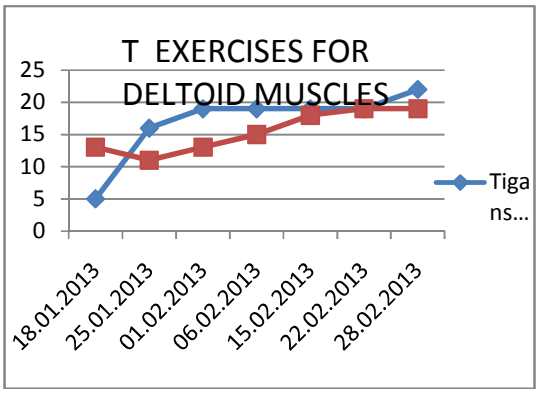

Figure 9. Exercesises for deltoid muscles

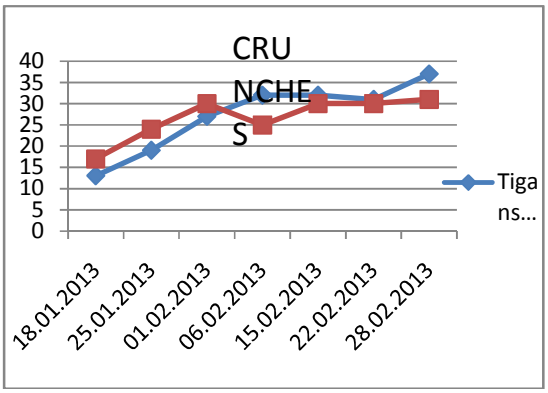

Figure10. Crunches

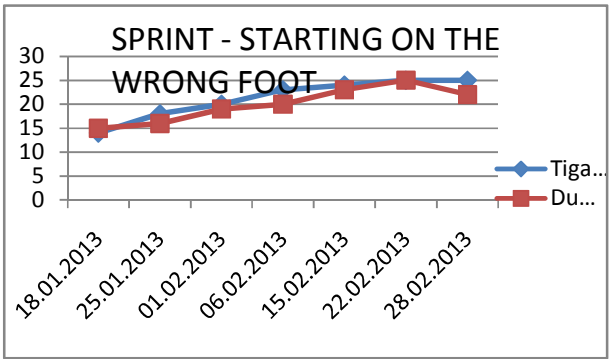

Fig.11 Sprint- starting on the wrong foot

Graphics regarding several applied tests for the two athlets.

CONCLUSION

Following this suspended training program (The TRX) showed that the two athletes were able to perform further reps in 30 seconds, but also noted an improvement in performance during official games and workouts since following parameters increased: speed reaction rate, muscle strength, balance and fitness level.

The benefits of suspended training exercises are not only for athletes. They are relevant to anyone looking for a safe and rapid method to improve physical fitness. The vast variety of exercises make the TRX a viable workout solution regardless of age, sex, training level and can be used almost anywhere. All exercises can be modified to form a personal training program for anyone.

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