

The comparison of two protocol of resistance exercise on upper and lower body muscles strength

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ABSTRACT

The objective of this study is to compare two common ways of training including weight training and elastic band-weight training in enhancing the upper and lower body parts. Thirty young untrained men (with the age, height, weight and body fat mass of 22.1 ± 2.4 yr, 174.8 ± 4.1 cm, 72.2 ± 3.1 and 18.2 ± 1.3 respectively) were randomly divided into two groups training with free weight (WT) and elastic band-free weight (BWT). They started their eight weeks training with 70-80% of one repetition maximum (1RM) and 6-10 repetitions. Their level of strength in exercises like bench press, triceps curl, shoulder press and squat were measured before and after these eight weeks, after that the acquired measures were assessed through T statistics which revealed a considerable amount $\alpha \leq 0.05$. Both groups underwent a distinctive change in their strength level in the aforementioned exercises (%22.51 increase in group WT and %23.56 in group BWT), although the difference was not significant. These results showed that the improvement in strength levels for untrained men through weight training or the band-free weight are the same so it is recommended for the beginners to start with the free weights.

Keywords: muscle strength, weight training, variable resistance training

INTRODUCTION

In recent years, many athletes have been attracted to weight training to increase the strength in their field in order to succeed. Choosing which exercise or training method is better is still open to question. Using weights is one of the most popular and proven ways to enhance the strength as well as power (1,12,15,16). During training with weights or machines the amount of pressure on the joints is stable all over the exercise as a result skeletal muscles undergo diverse pressures (20); mean while by using isokinetic Machines the exterior resistance during the completion of exercise differs, hence the change in muscle and nerves adaptability to the exercise. One way to achieve such goal is to use elastic band and cables along with weights which are recently being used by trainers and athletes (2, 4, 10, 21, 25, 26). Using elastic band, cables and weights can change the exterior pressure during the exercise and is certain exercise like bench press, forces the muscle to use more energy even in the trivial parts of the exercise. This method is called Variable Resistance Method which theoretically can improve the strength of the muscle in athletes (27). The background of using such elastic band shows that most of them are used especially for rehabilitative purposes. In addition, certain resistance exercises have been developed for some sports like badminton and such sports (3); it has been used for regaining strength in recent years. Adding elastic band to weights will inflict a great difference in the training patterns. In the concentric phase of the exercise and together with the start of the easier part of the

exercise these tubes amplify the pressure. On the other hand, they increase the pace of performance in the eccentric phase and gradually decrease the pressure in this phase which as a useful stimulus enhances the muscle adaptability leading to concentric contractions create more energy hence better metabolic function. This kind of contraction has a better neuron and muscle adaptability which causes more power and better hypertrophy (18). By adding elastic band to dumbbells and barbells the eccentric phase will be completed with more control and better pace that can increase the tensile strength in tendon and other stretchable tissues. This way you need more control and pressure during the exercise and more stabilizer muscles are to be involved which theoretically bring about better adaptability for people. Regardless of what has been told you, not many surveys have been conducted to back us up in this area. In 2008, Colado studied the usage of elastic band in middle aged women and proved that there is no distinguishable difference in this way although at the beginning of the study there were more physiological superiorities (7). Also in another study in 2009, they diverse pressures in exercises using elastic band (40% 1RM), chain-weight (50% 1RM) and weights (60% 1RM) which was carried out in seven weeks it showed that there is no difference in using them interchangeably (13). In some studies it was found that exercising with cables and weights has better results compared to weights only. However, the pressure in cables was more than that of in weights that put the study's result under question showing no superiority in using cables to weights (8, 24). So this study was conducted to show us which way is better in training?

MATERIALS AND METHODS

Subjects

Thirty young men ranging from 20 to 26 years of old with the age, height, weight and body fat mass of $22/1 \pm 2/4$ year, $174/8 \pm 4/1$ cm, $72/2 \pm 3/1$ kg and $18/2 \pm 3/1$ respectively, were put into groups randomly to train with weights and weight; none of them had any training background and all of them were healthy without any muscle, skeletal and hormonal problem also they had not used any hormone or food supplement during the past year.

Before the onset of the program they were invited to an orientation session in which everything was explained to them, in the next phase their strength and power and one repetition maximum in exercise like bench press, biceps curl, shoulder press in upper limbs and squat for lower limbs was measured. Three days later they participated in resistance exercises. In the end three days after the first training session the very first variables were tested.

Training protocol

The training program which was used in this procedure was for 8 week of training three days a week. In the first group they just trained with barbells and weights only and in the other group the trained with elastic band and weight. Every training session lasted one hour and the tests exercised bench press, biceps curl, triceps curl, shoulder press, squat, knee extension, leg curl and calf raises in three sets with 6 to 10 repetitions and one minute rest after each set. The pressure in both groups was 70 to 80 percent of one repetition maximum, the overload principle was in this way that when the repetitions exceed 12 repetitions about 2.5kg weight was added to the training pressure to maintain the repetitions in the 6 to 10 reps. In both groups the pressure of the training was remained the same all the time, before and after each training session five minutes were devoted to warm up and cool down. In the second group, training pressure was set to an extent that in the midrange the pressure was exactly the same as the first group. Again, before and after each training session five minutes were devoted to warm up and cool down. The first group training session was held in the even days' afternoon at 4-5 and the second group started its training session in the odd days' afternoon at 4-5 under the direct supervision of the researcher.

Measuring the Variables

The measuring factors in this study were the one repetition maximum in the following four exercises: bench press, biceps curl, shoulder press for upper body part and squat for lower in which 1Rm was measured three days before the first training and three days after the last one in the parallel conditions for both groups with the weights. All the methods and procedures were based on the Mode et al 2006 (17).

Statistical Methods

The method used in this section was descriptive statistics to find out the medium and standard deviation and also measuring the points of the tests and using the T method to determine the possible differences in their records before and after the test. T method was used to highlight the differences between these two groups. The level of significance of the tests was set to $\alpha \leq 0/05$. all the results in this study were measured by the SPSS edition 11.5 and for the bars and graphs we used Excel software.

RESULTS

The results of the acquired records were mentioned in the table 1 and figure 1. These results are for 8 weeks of training and show a considerable increase in 1RM in both groups in four exercises ($p \leq 0.05$). However, there is no significant difference in power enhancement in both groups.

Table1. The results from 1RM before and after the training in the study groups(M \pm SD)

Weight-elastic band training group			Weight training group			statistics variables
Increase rate	After test	Before test	increase rate	After test	Before test	
%20/58	42/93 \pm 3/34	35/60 \pm 3/60	%21/46	43/80 \pm 4/42	36/06 \pm 2/81	1RM in the bench press(kg)
%20/70	57/13 \pm 4/61	47/33 \pm 4/16	%19/85	56/33 \pm 5/62	47/00 \pm 4/14	1RM in the squat(kg)
%27/38	40/00 \pm 1/88	31/40 \pm 2/29	%25/98	39/13 \pm 2/06	31/06 \pm 2/40	1RM in the shoulder press(kg)
%25/94	36/60 \pm 2/58	29/06 \pm 1/79	%22/76	35/80 \pm 2/48	29/13 \pm 1/45	1RM in the triceps curl(kg)

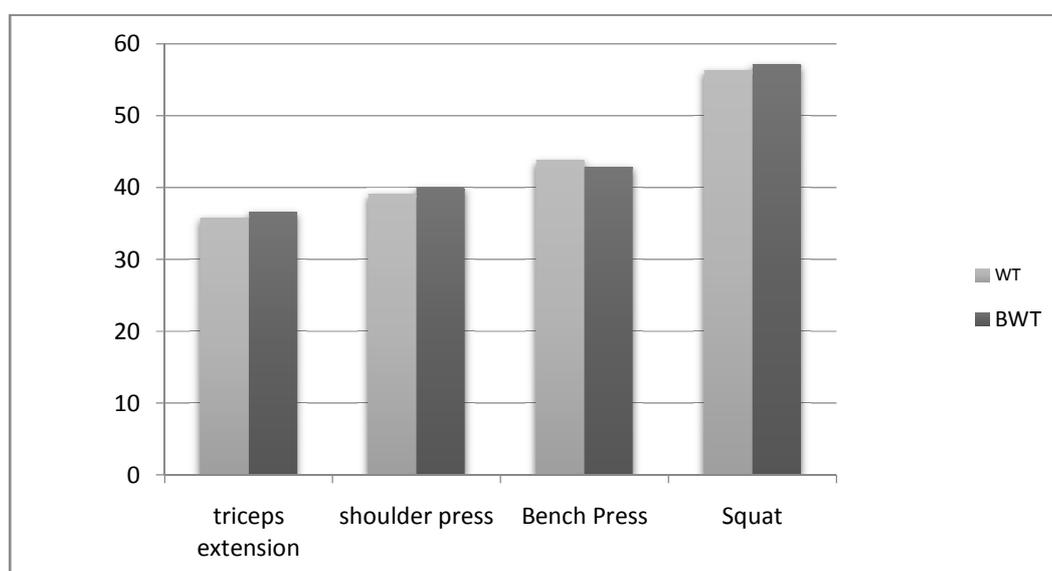


Figure 1. The changes in strength after 8 weeks in study groups

DISCUSSION

The current study was conducted to determine the effects of weight and resistance machines in two groups comprised of untrained young men for about 8 weeks and their comparison. As we were expecting, both ways of training can significantly enhance the muscular strength in upper and lower body parts. Table 1 shows that there is not any notable difference in power and strength gained through both ways which is in consistency with previously conducted experiments(7, 13, 19), although some studies report better results by using a combination of both ways (9, 22).

Generally, the types of the training, time, tests and kinds of the pressure are the reasons for the results and their difference in diverse studies. Reviewing such results show that whenever the resistance of the tubes and cables were more than the weights the power and strength was enhanced accordingly (10, 24). In recent years, this flaw was corrected and the amount of pressure was set as equal in both test(7, 8, 9, 10, 11, 24) and shows the exactly the same results in using both methods(9, 13). The other factor in the differences of the results in previously done experiments was the physical fitness of the tests. Ghigiarelli in their study for elastic band, chains and weights in seven weeks used young soccer players could not find a notable difference nevertheless adding tubes and chains were more beneficial (13). In this study untrained men were tested, however it is clear that the more trained tests used, the better the effects of the elastic band!! Although this study showed no notable difference in the strength levels of both groups, here may be other differences in some areas that have been ignored here. For example, Stevens on recently by comparing two groups that used squat by weights and elastic band showed that when cables come to play, the strength level will increase in the abduction and adduction phases. Based on the results of the current study the

power and strength level of groups who used cables and resistance machines is a bit more than the other one. Although this superiority is not significant, it is possible that by increasing the time of the protocol the differences will be significant. The limitations in using long term protocols (more than 12 weeks) caused many researchers to avoid them. All in all, the acquired results show that there is a little superiority in exercising by the elastic band and weights than to weights only, but it was not that much significant. So, it is highly recommended to beginners to use weights for the start and gradually add the cables and tubes to their training procedure.

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REFERENCES

- [1] American College of Sports Medicine: position stand. **2009**. *Med Sci Sports Exerc* 41: 687-708.
- [2] Anderson C.; **2005**. *Med Sci Sports Exerc*(abstract) 37(5):S186.
- [3] Behm D.G.;**1998**. *Natl Strength and Cond Assoc J* 10(4):66-70.
- [4] Berning J., Coker C., Adams K.,**2004**. *Natl Strength Cond Assoc*26(5):80-84.
- [5] Bobbert K.G., Gerritsen M.C., Litjens A., Van Soest A.J.;**1987**. *Med Sci Sports Exerc*19:332-339.
- [6] Burgomaster K A, Hughes S C, Heigenhauser G J F,Bradwell S N &Gibala M J; **2005**. *Journal of Applied Physiology*, vol. 98, no. 6, pp. 1985–1990.
- [7] Colado, J. C., and Triplett, N. T; **2008**. *J Strength Cond Res*, 22(5): 1441–1448.
- [8] Conlin, B; **2002**. Use of elastic bands in force training .*Strength and Conditioning Coach*. 10(2): 2-6.
- [9] Corey, E. A. **2008**. The effects of combining elastic and free weight resistance on strength and power in athletes. *Journal of Strength and Conditioning Research*.
- [10] Cronin J., McNair P.J., Marshall R.N.;**2003**. *J Sports Sci* 21(1): 59-71.
- [11] Ebben W.P., and R.L., Jensen;**2002**. *J Strength Cond. Res* 16(4):547-550.
- [12] Fleck S.J., Kraemer W.J. *Designing resistance training programs* (3rd edition) Champaign, IL: Human Kinetics. pp. 149-186. **2004**.
- [13] Ghigiarelli, J. J., Nagle, E. F., Gross, F. L., Robertson, R. J., Irrgang, J. J., and Myslinski, T.; **2009**. *Journal of Strength and Conditioning Research*. 23(3): 756-764.
- [14] Hakkinen K., and Komi P; **1983**. *Med Sci Sports Exerc*15:455-460.
- [15] Kraemer, W. J., and Ratamess, N. A.; **2004**. *Med Sci Sports Exerc* 36: 674-688.
- [16] Kraemer, W. J., Deschenes, M. R. & Fleck, S. J.; **1988**. *Sports Medicine* ,6, 246-256.
- [17] Maud, P.J and Foster C; **2006**; physiological assessment of human fitness. 2nd edition, Human Kinetics; 129-130.
- [18] Kazemzade Y, Banaeifar A, IzadyMand Zafari A.; **2013**. *European Journal of Experimental Biology*, **2013**, 3(5):418-421.
- [19] McCurdy, K., Langford, G., Ernest, J., Jenkerson, D., and Doscher, M.; **2009**. *J Strength Cond Res*, 23(1): 187-195.
- [20] McGinnis P.;**1999**. *Powerlifting USA*. 22(6):26-27.
- [21] Simoneau G.G., Berada S. M., Starsky A.J.; **2001**. *J Occupat Sports Phys Ther* 31(1): 16-24.
- [22] Stevenson, M. W., Warpeha, J. M., Dietz, C. C., Giveans, R. M., and Erdman, A.G.; **2010**. *J Strength Cond Res* 24(11): 2944–2954.
- [23] Treiber F.A., Lott J., Duncan J., Slavens G., Davis H;**1998**. *Am J Sports Med* 26:510-515.
- [24] Wallace B., Winchester, J., McGuigan, M.;**2006**. *J Strength Cond Res* 20(2): 268-272.
- [25] Waller M., Piper T., Townsend R.;**2003**. *Strength Cond J* 25(5):44-52.
- [26] Winters J.; **2006**. The Effects of the application of elastic resistance to a free weight bench press on upper body strength and power output production. (Abstract). Poster Presentation National Strength and Conditioning Conference. Washington DC.
- [27] Zatsiorsky V.M.;**1995**.*Science and Practice of Strength Training*. Champaign, IL: Human Kinetics.