ORIGINAL ARTICLE

Effect of Plyometric Training Versus Resistance Training on Physical Performance in Detrained Athletes

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ABSTRACT

Background: Detraining is cessation of training activity, which leads to considerable loss in players performance. Due to cessation of training, both recreational and competitive players underwent detraining such as reduced vertical jump capacity, dynamic balance in game, and sprinting capacity. Therefore, retraining with a suitable training procedure is essential for players. This study analyzes the training procedure which is suitable for detrained athletes. The need for the study is limited resources only found in the detrained athletes performance enhancement. The aim of the study is to find the effect of plyometric training and resistance training on the detrained athlete and to compare both plyometric training and resistance training on detrained athlete. **Method:** This study was pre-test post-test experimental study design; a total of 30 subjects were selected randomly in this study. They were divided into group A and group B, in which plyometric training and resistance training were given respectively. The total study duration was 6 months, with total training duration of 8 weeks. For both the groups, pre and post-test was taken for y-balance test, vertical jump test and 30 m sprint test. Paired t test and unpaired t test were used as a statistical tool for the within group analysis and between group analysis respectively. **Results:** There is a significant difference between group A and group B in y-balance test, vertical jump test and 30-M sprint test after the training. Group A shows clinical significance more than Group B in all post-test mean values, with the p value < 0.05. **Conclusion:** Plyometric training shows a significant improvement over resistance training on physical performance in detrained athletes.

Keywords: Plyometric training; Resistance training; Speed; Dynamic balance; Explosive strength; Detrained athlete

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INTRODUCTION

In the modern era, physical activities themselves are becoming a treatment for a lot of people. Obesity, diabetes mellitus, hypertension and cardiac problems are becoming more prevalent in the current society (John et al., 2018). Sports play an important role in contemporary society worldwide. The enthusiasm created by sports makes people mobile and creates awareness about physical activity. In that perspective, athletics is enjoyed by people from young age to old age. Athletics is often used synonymously with any sporting activity. Physical sports and games of any kind are known as athletics, which involves running, jumping, and throwing kind of activities.

The cessation of activities obviously gives an adverse effect on our body mechanism which influences the performance of an athlete. Mujika and Padilla (2000) have stated that “partial or complete loss of training induced anatomical, physiological, and performance adaptation”.

Recently, Muriel and co-researchers (2020) were the first to quantify objective measures of training load during the COVID – 19 lockdown period in elite cyclists. The authors noted 34% reductions in total training volume and reductions in weekly volumes in intensity zones ranging from 25 to 52% (effect size: 0.83 to 1.57) during the lockdown period, which contributed to reductions in maximum effort cycling performance.

The training interventions help in improving the physical performance in athletes who are detrained. Physical performances are anonymously referred to as speed, endurance, explosive strength, balance and agility.

Resistance training is known as the use of resistance to build muscular strength and size of the skeletal muscle. Researchers have proposed that resistance training intervention in youth population results in significant increase in strength, power and agility and reduced injury risk (Harries et al., 2012 and Lesinski et al., 2016.)

Plyometric training often requires athletes to jump, hop,

bound or skip, which leads to concentric and eccentric kind of contraction on muscles. Plyometric drills usually involve stopping, starting, and changing direction in explosive manner (Gabbett, 2000). Sale in 1991 had stated that Plyometric training induces specific neural adaptations which are helpful in doing better physical performance.

Speed can be easily defined as the rate at which the object covers the distance. For an athlete to have a top speed for the explosive first step and to accelerate rapidly, it is required that the athlete have a maximum speed. Furthermore, Triplet et al. (2012) showed that most sports do involve running at maximum speed and could help improve athletic performance. Thus, speed is an important factor for any athlete to compete in.

Explosive strength refers to the ability to exert a maximum amount of force in the shortest possible time, which is very much needed for an athlete to compete in any kind of game to give a quick threshold to achieve something. As Louis Simmons stated on numerous occasions, “even a marathon runner needs to sprint to the finish line”.

Balance ability was related to the level of competition in some sports with the more proficient athletes showing greater balance ability. There were significant relationships between balance ability and several performance measures. Therefore, improving balance is also considered a very important measure of physical performance which is needful for prevention of the injury and creates a good competitive environment in games. The purpose of the study is to determine the effect of Plyometric training versus Resistance training on physical performance in detrained athletes.

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METHODS

KG Institutional ethical committee approval and individual consent were obtained as per ethical guidelines. The design of this study was pre-test and post-test experimental study, and randomized sampling method was used. This study was carried out at the K.G campus sports ground and therapeutic gymnasium. This study duration was 8 weeks. Subjects were selected based on inclusion and exclusion criteria. The inclusion criteria are; the players should be athletes who were not in the training or playing environment for the past 8 months; healthy active athletes who have been participating in any track and game events for a minimum period of 1 year before detraining; athletes who play at least 3 competitive games a year and used to practice or play the game for a minimum of thrice a week; male players, at the age group of 18-25 years; body mass index (BMI) of 18.5-24.9. The exclusion criteria are; subjects who are going for a gymnasium or any other training program; subjects with any musculoskeletal and neurological abnormalities; and subjects who are not willing to participate in the study. A total of 30 eligible subjects were allocated randomly into group A and group B. This sample size met the requirement of a pilot study.

Training was given accordingly with plyometric training for group A and resistance training for group B. Vertical jump, y-balance and 30-meter sprint tests were used as outcome measures in this study (Paulo et al., 2012; Bulow A et al., 2019; Nigro F et al., 2016). Before the training program, all three outcome measures and demographic data were documented. Players in group A underwent plyometric training. Before the training session, each player was advised to do warm-ups and stretching. The Plyometric training was given to the subjects, based on the study described by Hamami et al., (2016). The training was basically one-hour session per day, 3 days weekly. Meanwhile, subjects in group B were advised to do proper stretching before training. Resistance training was given to the subjects based on one repetition maximum and one-hour session of training on a single day, 3 days per week. Resistance training was given to the subjects based on study described scientifically by Eskandar Taheri et al. (2014). Each exercise was performed for 6 repetitions and 4 sets only; the exercises using weights were done at 60% intensity of one RM. After each two weeks, the intensity was increased by 10% of one RM, in which some weights were added. Both groups continued the training for 8 weeks.

Paired T-test was used for within-group analysis and unpaired T-test was used for the between-group analysis.

RESULTS

Table 1 implies the demographic data of the male athletes.

Table 1: Demographic data

Variables	Grouping	n	%
Age (years)	18-21	22	73
	22-25	8	27
BMI	18.5- 21.5	20	66.66
	21.6-24.9	10	33.33

Table 1 shows the mean value of Group A and Group B post-test analysis of vertical jump test, y-balance test, and 30-meter sprint test respectively. For the vertical jump test, post-test values of Group A and Group B are 48.06 and 39.46, respectively, t is 5.78, which is significant at $p<0.05$, Therefore, there is a significant difference between group A and group B. For the Y balance, Group A post-test mean is 98.06 and group B post-test mean is 92.6, the t test value is 4.65, which is significant at $p<0.05$. Therefore, there is a significant difference between group A and group B. For the 30-

meter sprint test, the post-test mean of group A is 4.34 and group B posttest mean is 5.42, the value of t value is 10.04, which is significant at p<0.05, indicating a significant difference between group A and group B. Group A shows clinical significance compared to group B in all three outcome measures.

Figure 1 shows the post-test mean values of Group A and Group B for the vertical jump test, Y balance test and 30- meter sprint test.

Table 2: Post-test mean values of outcome measures for the Group A and Group B

Variables	Post-test means		't' values	P value
	Group A	Group B		
Vertical jump test	48.6	39.7	5.78	
Y balance test	98.6	92.6	4.65	0.01*
30-meters sprint test	4.54	5.81	10.04	

*significant at p ≤ 0.05

Figure 1 illustrates the difference between Group A and Group B in all the three measures.

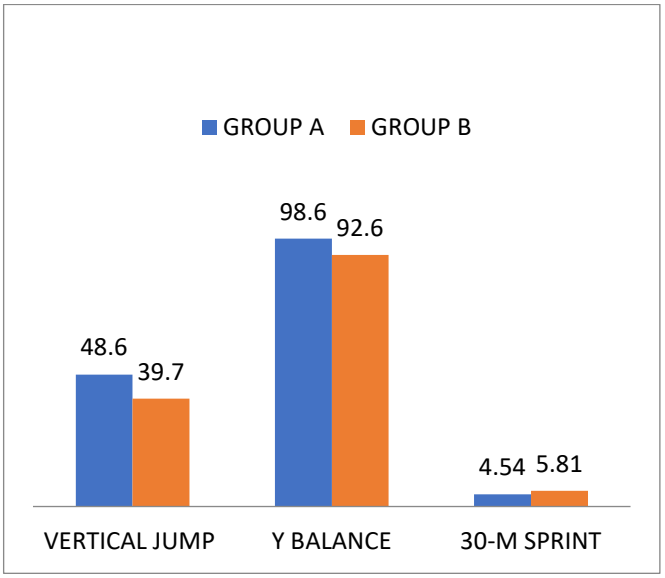

Figure 1: Post-tests mean difference between Group A and Group B

DISCUSSION

The purpose of the study is to determine the effect of plyometric training and resistance training on physical performance in detrained athletes. Detraining results in a decrease in fatty acid oxidation capacity in muscle, liver and adipose tissue, and increased body weight and fat mass. Furthermore, detraining reduces muscle capillary blood flow by reducing function, and negatively affects intramuscular energy metabolism (Laye et al., 2009). Resistance training found to improve physical performance in the athletes in this study. This improvement is due to the stimulations of mainly the anti-gravity or extensor muscles of the athlete. Apart from increasing power, other factors such as muscle length and temperature, body shape, and flexibility also should be noted in speedy performances (Haghighi et al., 2012; Negra et al; 2017). However, greater percentage of improvement was found in plyometric training compared to resistance training. Plyometric training shows better results in physical performance, because the training affects muscle spindles, Golgi-tendon, tendons, joints, balance and body positions control and this led to explosive strength improvement in these athletes (Bal et al., 2011).

This study is subjected to a few limitations. The small size of samples results in the study findings not able to be generalised. Therefore, the findings need to be used with caution. The study also involved male athletes only; therefore, does not represent all detrained athletes.

CONCLUSION

Detraining is the process to lose the performance which was previously gained. Therefore, there is a need for suitable retraining program to meet the demands and restore the earlier performance. This study concludes that plyometric training improves the physical performance of the detrained athletes more than resistance training. Further studies with larger samples are needed to confirm this study findings.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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