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## **THE EFFECTS OF SINGLE LEG HOP PROGRESSION AND DOUBLE LEGS HOP PROGRESSION EXERCISE TO INCREASE SPEED AND EXPLOSIVE POWER OF LEG MUSCLE**

### **Introduction**

There are many training methods that can develop physical fitness of the athletes. One of them is plyometric training method. Plyometric is a training method that are used to increase strength and explosive power. Rimmer and Sleivert (2000) reported that plyometric is a type of training that can develop the ability of muscles to increase strength in high speed (power). They also found that plyometric can increase 40m sprint. In addition, Singh (2011) stated that plyometric has contribution to increase of jumping, speed, and strength. Faigenbaum (2007) reported that playometric can increase the ability of jumping and speed of the junior basketball. Furthermore, Shalla-by (2010) found that plyometric can improve physical fitness and skill of basketball players.

Radcliffe and Farentinos (1999) suggested that plyometric training should be started by using two legs and one leg to improve strength and power. McCurdy, et al (2005) reported that exercise using one leg and two legs were effective to improve strength and power for men and women. Kariyama, et al (2011) stated that one leg movement will give power output and hip relatively high and ankle relatively low, while two legs movement increased power output at joint ankle. Vaczi (2013) reported that one leg exercise in short training program will have advantages to get strength quickly. Base on those literature reviews, therefore the main purpose of this study was to determine the effect of single leg hop progression and double legs hop progression exercise to increase speed and explosive power of leg muscles.

### **Methods**

This research was conducted using quasi experiment with matching only design. The population of this study were 39 male students at state senior high school 1 Gerung West Lombok Indonesia who join basketball club in this school. There were three groups in this study: experiment group 1 (13 students), experiment group 2 (13 students), and control group (13 students). Each group was given different treatment during 8 weeks with 3 times training a week. Group 1 was trained single leg hop progression, group 2 double leg hop progression, and group 3 conventional exercise. Instruments of this research were sprint 30m (speed) and vertical jump (explosive power) that were tested on each student during pre test and post test. Data was analyzed using t test – paired sample test with  $\alpha=0,05$  and Analysis of Varians (Anova).

## Results

The result of this study showed that there were significant increased of speed and explosive power at group 1 and group 2 (sig  $0,000 < \alpha = 0,05$ ). There were significant different between group 1, group 2 and group 3 (sig  $0,000 < \alpha = 0,05$ ). The calculation of Post Hoc Test was presented in Table 1 and Table 2.

**Table 1. LSD of Speed**

(I) groups	(J) groups	Mean		95% Confidence Interval		
		Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
single leg hop progression	double leg hop progression	.05846*	.02459	.023	.0086	.1083
	control	.14077*	.02459	.000	.0909	.1906
double leg hop progression	single leg hop progression	-.05846*	.02459	.023	-.1083	-.0086
	control	.08231*	.02459	.002	.0324	.1322
Control	single leg hop progression	-.14077*	.02459	.000	-.1906	-.0909
	double leg hop progression	-.08231*	.02459	.002	-.1322	-.0324

**Table 2. LSD of Explosive Power**

(I) groups	(J) groups	Mean		95% Confidence Interval		
		Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
single leg hop progression	double leg hop progression	1.26846*	.32296	.000	.6135	1.9235
	control	2.52385*	.32296	.000	1.8689	3.1788
double leg hop progression	single leg hop progression	-1.26846*	.32296	.000	-1.9235	-.6135
	control	1.25538*	.32296	.000	.6004	1.9104
Control	single leg hop progression	-2.52385*	.32296	.000	-3.1788	-1.8689
	double leg hop progression	-1.25538*	.32296	.000	-1.9104	-.6004

There were significant different between group 1 and group 2 on speed (sig.  $0,023 < \alpha 0,05$ ) and explosive power (sig.  $0,000 < \alpha 0,05$ ). There were significant different between group 1 and control group on speed (sig.  $0,000 < \alpha 0,05$ ) and power (sig.  $0,000 < \alpha 0,05$ ). There were significant different between group 2 and control group on speed (sig.  $0,002 < \alpha 0,05$ ) and explosive power (sig.  $0,000 < \alpha 0,05$ ). Base

on LSD above, it shown that there were significant different between single leg hop progression, double leg hop progression and conventional exercise. Single leg hop progression had better effect on speed and explosive power than double leg hop progression and conventional exercise.

### **Discussion**

Physical fitness is one of the important component for success to support the players during the competition. Speed and explosive power are needed by basketball player especially for lay up, jump shoot, rebound, and dribble. There are many kinds of exercise that can improve speed and explosive power, including single leg hop progression and double leg hop progression. Single leg hop progression has better result in improving speed and explosive power than double leg hop progression. It because of single leg hop progression can cause a heavier load compare to double leg hop progression. Although those exercise use the same their own body, however, single leg hop progression is more difficult. This finding is supported by some previous studies that reported one leg exercise in short training program will have advantages to get strength quickly; and one leg movement will give power output and hip relatively high and ankle relatively low, while two legs movement increased power output at joint ankle (Vaczi, 2013; Kariyama, et al, 2011). Single leg hop progression and double leg hop progression exercise have effect in increasing speed and explosive power of the players in this study. This is also supported by previous study that exercise using one leg and two legs were effective to improve strength and power for men and women (McCurdy et al, 2005).

Single leg hop progression is a better exercise to improve speed and explosive power. This finding is consistent with the result of relevant research which found that women who give one leg jumping exercise can improve jumping height quickly compare to two legs; plyometric training with one leg is better than two legs to improve explosive power women volleyball, therefore it can be used as reference for improving speed and explosive power (Makaruk, 2011; Dalacore et al, in McCurdy, 2005).

It can be concluded that single leg hop progression and double leg hop progression exercise can improve speed and explosive power, however, single leg hop progression is better than double leg hop progression in increasing speed and explosive power.

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#### *THE EFFECTS OF SINGLE LEG HOP PROGRESSION AND DOUBLE LEGS HOP PROGRESSION EXERCISE TO INCREASE SPEED AND EXPLOSIVE POWER OF LEG MUSCLE*

*The main purpose of this study was to determine the effect of single leg hop progression and double legs hop progression exercise to increase speed and explosive power of leg muscles. Plyometric is one of the training methods that can increase explosive power. There are many models of plyometric training including single leg hop progression and double leg hop progression. This research was experimental using match subject design techniques. The subjects of this study were 39 students who joined basketball school club. There were 3 groups in this study: Group 1 were 13 students who given single leg hop progression exercise, Group 2 were 13 students who given double legs hop progression exercise, Group 3 were 13 students who given conventional exercise. The*

data was collected during pre test and post test by testing 30m speed running and vertical jump. The data was analyzed using Analysis of Varians (Anova). It was found that there were significantly increased on speed and explosive power of leg muscles of Group 1 and Group 2. It can be stated that single leg hop progression exercise was more effective than double leg hop progression exercise. The recent findings supported the hypothesis that single leg hop progression and double legs hop progression exercise can increase speed and explosive power of leg muscles. These finding were supported by some previous studies (Singh, et al, 2011; Shallaby, H.K., 2010). The single leg hop progression is more effective than double legs hop progression. This finding was consistent with some previous evidences (McCurdy, et al, 2005; Makaruk et al, 2011).

**Key words:** single leg hop progression, double leg hop progression, speed, explosive power, and leg muscles.

„Dan“, 27. mart 2015.

ОДРЖАНА КОНСТИТУТИВНА СЈЕДНИЦА ПОЧАСНОГ ОДБОРА КОНФЕРЕНЦИЈЕ „СПОРТСКА ДОСТИГНУЋА“



## Развијати и научну димензију у области спорта

Већа међународна видљивост и оснаживање препознатљивог квалитета црногорског спорта заједнички је задатак академске, друштвене и спортске заједнице, а удруженим и посвећеним радом ти циљеви се могу и остварити. То је порука коју је на првој, конститутивној сједници упутио Почасни одбор међународне научне конференције „Спортска достигнућа“, којим предједава председник Владе Црне Горе Мило Ђукановић.

– Спорт представља најпрестижнију дјелатност у нашој држави, којом се Црна Гора данас најубједљивије представља на међународном тржишту. Зато морамо обезбиједити шире разумијевање и подршку укупне друштвене заједнице људима који су великим резултатима. Важно је развијати и

научну димензију у области спорта, за шта су заслужне институције попут Факултета за спорт и физичко васпитање, рекао је Мило Ђукановић, поред којег су чланови Почасног одбора и: министарка науке Сања Влаховић, министар просвјете и председник РСЦГ Предраг Бошковић, градоначелник Подгорице Славољуб Стијеповић, председник ЦОК-а мр Душан Симоновић, директор Управе за младе и спорт Игор Вушуровић, председник АСЦГ Милорад Вулегић, председница Скијашког савеза Весна Меленица, председник ВИСЦГ Срђан Ковачевић, рукометни тренер Драган Ашић, ватерполо тренер Петар Поробић, фудбалски тренер Миодраг Божовић, рукометашица Катарина Булатовић, ватерполиста Никола Јановић, судиста Срђан Мрва-

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Међународна научна конференција о трансформационим процесима у спорту „Спортска достигнућа“, 12. по реду одржава се од 2. до 5. априла у Подгорици, и окупиће преко 160 водећих свјетских аутора и истраживача у области спортских, друштвених и хуманистичких наука и медицине из 22 земље. Конференцију организују Црногорска спортска академија и Факултет за спорт и физичко васпитање, под покровитељством Универзитета Црне Горе.

Т.Б.