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Plyometric stair jump and reaction box jump towards the leg muscles explosive power and straight-head kick frequency of pencak silat athletes

I Wayan Sumadita[1,*], I Ketut Sudiana[2], I Ketut Iwan Swadesi[3]

[1,2,3]Universitas Pendidikan Ganesha, Singaraja, Indonesia

[1]iwayan.sumadita08@gmail.com *; [2] ketut.sudiana@undiksha.ac.id ; [3] iwan.swadesi@undiksha.ac.id
*corresponding author

ABSTRACT

This study aimed at determining; 1) the different effects of leg muscle explosive power and straight-ahead kick frequency towards Pencak Silat athletes who participate in plyometric stair jump training and reaction box jump training at SMI Bali, 2) the different effects of leg muscle explosive power of Pencak Silat athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali, 3) the different effects of straight-ahead of Pencak athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali. A quasi-experimental was used as the research design of this study by adapting a non-randomized control group pretest-posttest model. The sample of this study was 45 athletes. Pre-test and post-test were used as the technique of data collection which was conducted by using a standing broad jump test as a research instrument. The collected data were analyzed quantitatively by using One-Way MANOVA. The findings indicated that: 1) there was a significant difference between the effect of leg muscle explosive power and straight-ahead kick frequency towards Pencak Silat athletes who participated in plyometric stair jump training and reaction box jump training at SMI Bali indicated by its significance value (0.000) which was less than 0.05. 2) there was a different effect of leg muscle explosive power of Pencak Silat athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali shown by a significant value of 0.000 which was less than 0.005, 3) there was a different effect of straight-ahead of Pencak athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali with a significant value 0.000 which was less than 0.005.
Keywords: *explosive power, plyometric, box jump*

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Correspondence Address:
I Wayan Sumadita
Universitas Pendidikan Ganesha
Singaraja
E-mail: iwayan.sumadita08@gmail.com

INTRODUCTION

Pencak silat is a sport that contains skills and knowledge about powerful movement patterns that are effective, beautiful, and healthy for the body imbued with noble character based on devotion to God (Kurniawan, 2018). Through beautiful and powerful movements, pencak silat can grow a high spiritual soul and a strong body (Widyalaksono, Mashuri, & Lusianti, 2020). Therefore, pencak silat is often called an aesthetic martial sport to foster social responsibility.

Pencak silat as a vehicle for education offers noble values which include mental, spiritual,

sports, arts, and martial arts aspects (Muhtar, 2017). These noble values become one unified martial arts athlete (Widyalaksono et al., 2020). Thus, pencak silat becomes one of the tools to build a national character with the uniqueness and noble values contained therein, even the nation's cultural values are contained therein as well.

Pencak Silat is one of the sports branches in Indonesia which is valued as the cultural characteristic of Indonesia originally from Malay culture. Pencak Silat is easily found in every region of Indonesia and it has been recognized by society internationally. Pencak Silat was born from a cultural result where historically Indonesian people did a kind of self-defense that was existential and had the integrity to the surrounding environment and towards nature in achieving harmony or balance of life to improve the aspects of faith and improve the aspect of obedience or piety to the Almighty of God (Sudiana & Spyanawati, 2017). Pencak Silat which is known by the public is considered a supporting component in self-defense, it contains four elements which include; a sports section, arts, martial arts, and spiritual elements.

However, there are many Pencak Silat associations or clubs organized or sheltered by IPSI Bali as Pencak Silat Organizations in Bali, such as; Bakti Negara, Kerta Wisesa, Tapak Suci, PSHT, Merpati Putih, PP Suro, and SMI Bali. SMI Bali is the newest Pencak Silat club that joins IPSI Bali. It is demanded to create 5 management in each regency or city as a minimal requirement for joining IPSI Bali. Pencak Silat athletes of SMI Bali are still beginners where they are still trained and improving to be better athletes. They are still prepared to compete with other athletes from different clubs who have more experience in joining a competition whether it is a regional, national, or international competition.

To improve Pencak Silat athletes' achievement in which the improvement is influenced by several things; physical condition, mental condition, behavior, environment, and basic technique. A good physical condition has an important role in creating and practicing the athletes' basic technique. Improving physical condition is one of the indicators of achieving physical fitness. When athletes have good physical fitness, it will lead them to have better movement in applying the technique that they learn. Mashuri (2017) states that ten components of physical condition are required to be fulfilled in sports in which the fulfillment is relevant to the sports branches joined by the athletes. Those components are strength, endurance, power, speed, flexibility, agility, coordination, balance, accuracy, and reaction (Bompa & Buzzichelli, 2019).

The physical training commonly done by teacher and athletes only cover flexibility, arm strength, speed, cardiovascular endurance, and others. Pencak Silat athletes are rarely given consistent training related to the leg muscle explosive power, and straight-ahead kick concern

by the athletes themselves (Lubis & Wardoyo, 2014). In addition, the coach or teacher does not understand the importance of physical condition training that must be given to the athletes particularly the leg muscle explosive power and the frequency of straight-ahead kicks. In improving the leg muscle explosive power and the frequency of straight-ahead kicks, it is necessary to provide proper training to achieve a good and efficient improvement of students' physical condition as the training goal. Therefore, to achieve this goal, additional training is needed in which it is in the form of plyometric stair jump and reaction box jump training to support the leg muscle explosive power of the leg muscles when the athletes practice the straight-ahead kick technique. to improve performance in the SMI Bali Pencak Silat sport, especially the fighting category. It can be perceived as a way for improving Pencak Silat athletes' performance at SMI Bali.

A plyometric stair jump is a form of training that can help generate explosive leg muscles gradually and challengingly (Chaabene et al., 2019; Mashuri, 2013). Meanwhile, the Plyometric Reaction Box jump is a form of training to jump over wooden boxes that can be done with audible or visual stimulation, allowing you to work to reduce reaction time and rate of strength development for explosive endeavors. The two pieces of training are expected to be able to increase the leg muscles' explosive power and the frequency of straight-ahead kicks for the SMI Bali Pencak Silat athletes. Based on the background that has been elaborated above, it can be seen that there are several problems, such as; first, is there a different effect of leg muscle explosive power and the frequency of straight-ahead kicks between athletes participating in plyometric stair training jump with athletes participating in the plyometric reaction box jump training at SMI Bali? Second, is there a different effect of leg muscle explosive power between the athletes participating in plyometric stair jump training and the athletes participating in plyometric reaction box jump training for SMI Bali martial arts athletes? Third, is there a different effect of the frequency of straight-ahead kicks between the athletes participating in plyometric stair jump training and athletes participating in plyometric reaction box jump training on SMI Bali Pencak Silat athletes?

In relevant to the problems that had been identified, then, this study is intended to find out; the different effects of leg muscle explosive power and straight-ahead kick frequency on Pencak Silat athletes who participate in plyometric stair jump training and reaction box jump training at SMI Bali, the different effect of leg muscle explosive power of Pencak Silat athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali, the different effects of straight-ahead of Pencak athletes participating in plyometric stair jump training with the athletes participating in reaction box

jump training at SMI Bali

METHODS

Quasi-experimental was used as the method of this study which used a non-randomized control group pre-test and post-test model (Mashuri & Artanayasa, 2021). There were 45 athletes were involved as the sample of this study. They were divided into three main groups in which 15 athletes were treated by using the Stair Jump, 15 athletes were treated by Reaction Box Jump, and 15 athletes were treated by using the conventional strategy. The data were collected by conducting pre-test and post-test in which the instrument was a standing broad jump test for power. A validity and reliability check was conducted before the data were analyzed. It was conducted through normality and homogeneity test. A normality test was conducted by using Shapiro-Wilk since the sample was less than 50. Meanwhile, Levene was used for the homogeneity test. The collected data were continuous to be analyzed quantitatively by using the inferential statistic in the form of One-Way MANOVA for the hypothesis test. The analysis was conducted with the assistance of SPSS 22.0 PC for Windows where the consideration was viewed from the significant level of 0.05.

RESULT AND DISCUSSION

Based on the analysis that had been conducted, the hypothesis test result showed that; 1) there is a different improvement of the significant effect of leg muscles' explosive power and straight-ahead frequency towards Pencak Silat athletes who participate in plyometric stair jump training and reaction box jump training at SMI Bali indicated by its significance value (0.000) which was less than 0.05. 2) there was a different effect of leg muscle explosive power of Pencak Silat athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali shown by a significant value of 0.000 which was less than 0.005, 3) there was a different effect of straight-ahead of Pencak athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali with a significant value 0.000 which was less than 0.005.

Several reasons could be used as the basic justification related to the better achievement of the plyometric stair jump training group towards athletes' leg muscle explosive power and the frequency of straight-ahead kicks compared to the reaction box jumps training group. It was found that stair jump training could assist to generate the leg muscle explosive power and the frequency of straight-ahead kicks in a gentle, gradual, and challenging manner. Besides that, plyometric stair jump training was one type of plyometrics exercise in the form of repeated climbing and descending stairs. The whole training model involved the contraction of all

muscles in the lower legs, whether it was jumping, leaning, or lifting weights in an inner load (self-load) requiring strength, speed, and coordination of the two elemental abilities (Sari, Maulang, & Darwis, 2020). The exercise was carried out with a measured, systematic, and programmed intensity, based on the workload and intensity given for each exercise.

The findings in this study indicated that the stair jump plyometric training method had a comparative advantage over the reaction box jump training method in terms of increasing leg muscle explosive power and the frequency of straight-ahead kicks for Pencak Silat athletes. It was indicated that the leg muscles' explosive power and the frequency of straight-ahead kicks could be increased by applying the plyometric stair jump training method. In the plyometric stair jump training method, athletes are actively involved in training activities, they were always trained to increase their leg muscles strength (Mashuri, 2021). The exercise method in the plyometric stair jump was conducted with a measured, systematic, and programmed intensity, based on the load and work intensity given for each exercise (Rojas, Oña, Gutierrez, & Cepero, 2000). Related to this indication, the coach or teacher was supposed to have good ability in providing training with the plyometric stair jump training method to the athletes. The polymetric star jump exercise was one of the ways to increase the leg muscles explosive power considering that it was useful in increasing leg strength and cardiovascular endurance (Mashuri, 2013, 2017, 2021). The mechanism of the training movement mostly involved the muscles of the lower body. The movement was done repeatedly. However, based on the findings of a previous study showed that good leg muscles explosive power had a role in the practice of straight-ahead kicks. It was also added that the straight-ahead kicks done by the athletes would not be optimal if the leg muscles' explosive power is not strong enough. It could be concluded that there was a positive and significant relationship between leg muscles' explosive power toward straight-ahead kick ability (Sasmitha & Suwirman, 2021). There is a difference between the plyometric stair jump training method and the reaction box jump training in achieving the frequency of the front straight kick supporting the finding that the average value of the frequency of the front straight kick of the athletes participating in the plyometric stair jump training method was higher than the athletes joining reaction box jump training. Although the stair jumps plyometric training had a positive effect on the leg muscles' explosive power (Andrejic, 2012) and the frequency of the athletes' straight-ahead kicks. Several things still became obstacles of this study, such as; there still athletes who are not present during the plyometrics stair jumps training schedule, the athletes' movements were still inaccurate in doing stair jumps movement, and at the beginning of training, the athletes were not perfect in doing the movement, because they were joining the training for the first time.

In addition, the findings of this current study supported the previous studies that also investigated the effect of a plyometric jump in sports. It supported the previous study which showed that plyometric training had a significant effect on students' achievement in volleyball training, particularly in their smash skills (Kurniawan & Ramadan, 2016). It was also relevant to the finding which revealed that plyometric box jump and standing jump had a significant effect in improving athletes' vertical jump (Bagaskara & Suharjana, 2019). The current findings of this study were relevant to the previous study which found that plyometrics had a significant effect on students' fitness in which fitness was a factor that also influences the leg muscles' explosive power (Nugroho & Gumantra, 2022). As what had been found that plyometric reaction jumps and stair jumps had a significant effect on leg muscles' explosive power in which both of them showed different results in swimming jumping start distance result of the athletes (Suratno, Artanayasa, & Suratmin, 2021). On another side, the current findings were in contrast to the implementation of plyometric reaction jumps and stair jumps toward legs muscles explosive powers of male volleyball athletes. It was found that plyometrics had no significant effect on the legs muscles' explosive powers of male volleyball athletes instead affecting the reaction speed of the athletes (Supriyanto, 2018).

CONCLUSION

Based on the results and discussion of this study, it can be concluded that; 1) there was a significant difference between the effect of leg muscle explosive power and straight-ahead kick frequency towards Pencak Silat athletes who participated in plyometric stair jump training and reaction box jump training at SMI Bali indicated by its significance value (0.000) which was less than 0.05. 2) there was a different effect of leg muscle explosive power of Pencak Silat athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali shown by a significant value of 0.000 which was less than 0.005, 3) there was a different effect of straight-ahead of Pencak athletes participating in plyometric stair jump training with the athletes participating in reaction box jump training at SMI Bali with a significant value 0.000 which was less than 0.005.

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