

Effect of Standing Jumps and Box Drills to Explosive Power in Momtong Dollyo Chagi

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Abstract— This study is used to find out: 1) the difference in explosive power of kick momtong dollyo chagi between plyometrics standing jumps and box drills on taekwondo at Senior High School 1 Leuwiliang, Bogor, 2) The difference in explosive power of kick momtong dollyo chagi between plyometrics standing jumps and box drills on taekwondo for who have high flexibility, 3) The difference in explosive power of kick momtong dollyo chagi between plyometrics standing jumps and box drills on taekwondo for who have low flexibility, 4) Interaction between plyometrics exercise standing jumps, box drills and flexibility to explosive power of momtong dollyo chagi on taekwondo at Senior High School I Leuwiliang, Bogor. The scores obtained are sorted from highest to lowest amounting to 36. The conclusions of this study are: 1) Overall there is a significant difference between standing jump method with box drills method to the explosive power kick momtong dollyo chagi, 2) For taekwondo who have high flexibility standing jump exercise better than box drills method on explosive power kick momtong dollyo chagi, 3) For taekwondo who have low flexibility box drills method better than standing jump exercise on explosive power kick momtong dollyo chagi, 4) There is a positive interaction between standing jump exercise, box drills method and flexibility on explosive power kick momtong dollyo chagi.

Keywords— Taekwondo, Explosive Power, Plyometrics Exercise

I. INTRODUCTION

In terminology, “Taekwondo” comes from Korean language, consist of tae: feed, kwon: hand, do: art. by means, taekwondo is a martial art that combine some techniques of hand and feed. It is like martial art in general, taekwondo has the similarity concepts of application of technique and the two elements. In carrying out the attack by kicking, it is necessary to have a good physical and technique, because in kicking movement, will involve some hip muscles, good legs, and also need strength, speed, balance, flexibility, the explosive of limb muscle, agility, and coordination. When we doing a quick and precise kick, it is influenced by the ability of the explosive of leg muscle, taekwondo, especially the leg muscle which can exert maximum strength in the shortest time. It can be concluded that the leg muscle of taekwondo has the explosive power of leg muscle in kicks.

Dollyo chagi kick is a kick technique that including in the martial art, Taekwondo. The definition of kick dollyochagi is a circular kick towards the pit of the heart/ stomach or head, feet lift straight in front and fold turn the body straight with the thighs and then sniff in with snapping (pull the legs after the target) [1]. Pliometrics is an exercise which has special feature of very hard muscle contraction and it is the response of dynamic load or rapid strain of the muscles. By applying this method, there is a synergy between the increase of power (explosive power) muscle and the speed of producing of momtong dollyo chagi kick as strong as possible and can be returned as soon as possible in position to do the next attack.

Explosive power is equal to strength times speed. It means that the ability of explosive power is a combination of strength and speed elements [2]. Explosive power has to have both strength and speed elements. Strength is one of very important element and must be possessed by an athlete, because in every sport requires muscle strength beside to the other elements. The success of taekwondo coaching in Indonesia cannot be separated from the success of sport coaching in every schools, because there are a lot of schools that carry out taekwondo as extracurricular activities. This is not excessive because the essence of extracurricular activities are to shape and improve the achievement.

Leuwiliang 1 senior high school is one of the units owned by Polwil Club or better known as Harries Club. This school is the center for students who excel, weather in the fields of achievement, arts, and academics. It is no wonder that this school became a pre-eminent school.

A. Understanding Explosive Power

Explosive power is a necessary physical component in various sports. Explosive power is the ability of the muscles to overcome resistance with a very rapid contraction. Explosive power is important for some explosive sports such as: Sprint, hurdles, athletic throwing and jumping numbers. explosive power is the result of force x velocity, where force is equivalent with strength, and velocity with speed [3]. explosive power is the primary ability to achieve goals. [4]

Explosive power is equal with strength times speed, it means that the power of explosive power is a blend of elements of strength and speed. The explosive power must

have both strength and speed elements. Strength is one of very important elements and must be possessed by an athlete, because every sports requires muscle strength beside to the other elements. From some opinions of the experts, it can be concluded that strength is the effort done by using maximum power in overcoming a barrier. It is known that the element of strength plays a role in almost all sports. Biomotoric elements such as agility, co-ordination flexibility, speed and so on are the combination of strength

Explosive power is influenced by several large maximal levels of strength, if it does not have a maximum of strength, then explosive power will not reach the high standards. Strength remains the basic for the formation of explosive power. Therefore, before explosive power training, people must have a good level of muscle strength. Athletes who learn strength training can help to prevent injury and improve appearance, and helps recovering faster from the injury [3].

B. Momtong Dollyo Chagi Kick Technique

Taekwondo which means the art of kicking, blocking and hitting also has basic techniques that include the movement of hit, leap, kick, evasion, and blocking. In general, the kicking in taekwondo is very dominant compared to the mastery of hitting, mastery of kicking is a priority that is done, so that people can know taekwondo as martial arts from the beauty, speed, and kick strength.

Like the meaning of kicking, the dollyochagi kick is a series of movements in which there is flexion (wrinkle) and extension (stretch) of the muscles and joints of the kicking. As for flexion extension, it occurs in the joints of kose (groin joints) and the muscles that move are: paos mayor, IIIachus, Gluteus maximus, and the hamstring group [5]. In general, the main movement of the kicking, especially in the dollyo chagi kick is: bending the leg in the joint between the femur with the tibia and fibula and the muscles that move it, and supported by the mobility of the articulation, then stomp or stretching to the target precisely and hard.

C. Pliometric Exercises

Plyometric exercise is one of the favorite exercises practiced by trainers today, especially in sports that require leg muscles or arm muscles to exercise, the history of this exercise began in 1960. Yuri Veroshanki a Russian athletic trainer used plyometric exercise methods for his jumping athletes and experiencing extraordinary success at the competition. Pliometric began to be a concern during 1972 during the Munich Olympics, West Germany. Russia's Valery Borzov won the 100-meter run with a time of 10.00 seconds and won the 200-meter sprint. Those because of the contribution of the use of the plyometric training method, which eventually Yuri Veroshanki was called as the 'father' of pliometric research. Pliometric exercises are not only able to develop and improve the ability of muscle reactions, but this exercise can also increase the reactions of the muscle nerves [6]. This is showed by the results of research conducted by Veroshanki and Tatyana which the results of their experiments showed that the benefits

of pliometric exercises were able to increase the muscle nerve reaction of the apparatus [7].

It can be concluded that pliometric exercise is an exercise method to increase muscular explosive power by combining isometric and isotonic (eccentric) exercise by using dynamic loading. A sudden stretch before the muscle contracts back or an exercise that allows the muscles to reach maximum strength in the shortest time.

The form of plyometric exercise in this study focused on the sport of taekwondo. Therefore, the exercise of standing jumps and box driils are specifically designed to increase the explosive power of momtong dollyo chagi.

II. METHOD

The method used in this study is an experimental method with a 2 x 2 factorial design. In this study there are three research variables, one dependent variable and two independent variables. As the dependent variable, the explosive power of the momtong dollyo chagi kick (Y) and two independent variables are pliometric exercises as experimental variables (A) and flexibility (B) as attribute variables.

Variable treatment of plyometric exercises (A) is divided into two, the practice of standing jumps (A1) and exercise box driils (A2). Attribute variable (B) is divided into two types, high (B1) and low (B2). Determination of design refers to the opinion of Sudjana, it is the experimental units are grouped in such a way that the experimental units within the cell are relatively homogeneous and many experimental units in the cell are the same as the many treatments being studied [8]. experimental units within each cell.

TABLE I. 2X2 FACTORIAL DESIGN

Flexibility (B)	Pliometric exercise (A)	
	Standing Jumps (A1)	Box Driils (A2)
high (B1)	A ₁ B ₁	A ₂ B ₁
low (B2)	A ₁ B ₂	A ₂ B ₂

Information :

- A1B1 = Standing Jumps Group for taekwondoin that has high flexibility to the explosive power of momtong dollyo chagi kick.
- A2B1 = Box Drill group for taekwondoin that has high flexibility to the explosive power of Momtong dollyo chagi kick.
- A1B2 = Standing Jumps Group for taekwondoin which has low flexibility to the explosive power of momtong dollyo chagi.
- A2B2 = Box Driils group for taekwondoin that have low flexibility to the explosive power of Momtong dollyo chagi kick.
- A1 = Standing Jumps group

It is appropriate with the research design, there are two kinds of data that must be collected; (1) The Data about

explosive power of momtong dollyo chagi kick, and (2) The Data of flexibility. To obtain the explosive power data of momtong dollyo chagi kick, this research used an explosive power test. The procedures of kicking test are:

- Taekwondoin stands in front of the tool with the ready position
- Taekwondoin kicks into the medicine ball on the cue and returns to the starting position
- The distance recorder records the distance obtained from the fall of a medicineball kicked
- Taekwondoin was given a chance to kick 3 times, and what was recorded was the best distance. Meanwhile, to know the data about the formation obtained by using sit and reach tes

III. RESULTS

TABLE II. THE SUMMARY OF THE CALCULATION OF THE VALUE OF \bar{x} AND S OF THE RESEARCH DATA.

Flexibility	The method of Pliometric exercise	
	Standing Jump	Box Drills
High	$\sum x = 116,8$ $\sum x^2 = 13642.2$ $\bar{x} = 12.98$ $S = 0.10$ $n = 9$	$\sum x = 114.59$ $\sum x^2 = 13130.9$ $\bar{x} = 12.73$ $S = 0.08$ $n = 9$
Low	$\sum x = 115.05$ $\sum x^2 = 13236.5$ $\bar{x} = 12.78$ $S = 0.09$ $n = 9$	$\sum x = 115.76$ $\sum x^2 = 13400.4$ $\bar{x} = 12.86$ $S = 0.11$ $n = 9$
Total	$\sum x = 231.39$ $\sum x^2 = 53541.3$ $\bar{x} = 12.86$ $S = 0.15$ $n = 18$	$\sum x = 230.81$ $\sum x^2 = 53273.3$ $\bar{x} = 12.82$ $S = 0.11$ $n = 18$

A. The score of explosive power of momtong dollyo chagi kick in the group of Pliometric standing jump exercise in overall.

The data of the score of explosive power of momtong dollyo chagi kick in the group of Pliometric standing jump exercise in overall. Obtained from 12.70 to 13.70, obtained an average of 12.88, standard deviation of 0.14 and the frequency distribution as shown in table 3 below.

TABLE III. THE SCORE OF FREQUENCY DISTRIBUTION OF THE EXPLOSIVE POWER OF MOMTONG DOLLYO CHAGI KICKS ON THE PLYOMETRIC OF STANDING JUMP METHOD IN WHOLE

No	Score	Absolute frequency	Relative frequency (%)
1	12.70 – 12.80	6	33.33%
2	12.81 – 12.90	5	27.78%
3	12.91 – 13.00	4	22.22%
4	13.01 – 13.10	2	11.11%
5	13.11 – 13.20	1	5.56%
Total		18	100

On the average, and 61.11% (11 people) are in below of the average.

B. The score of the explosive power of momtong dollyo chagi of the group of plyometric Box drill method in overall.

The data of the score of the explosive power of momtong dollyo chagi of the group of plyometric Box drill method in overall. It is obtained the range between 12.61 to 13.04 and obtained the average of 12.80, standard deviation of 0.11 and the frequency distribution as shown in table 4 below.

TABLE IV. FREQUENCY DISTRIBUTION OF EXPLOSIVE POWER SCORE OF MOMTONG DOLLYO CHAGI KICK ON THE PLYOMETRIC OF BOX DRILL IN WHOLE.

No	Score	Absolute frequency	Relative frequency (%)
1	12.61 – 12.71	4	22.22
2	12.72 – 12.81	7	38.89
3	12.82 – 12.91	4	22.22
4	12.92 – 13.01	2	11.11
5	13.02 – 13.11	1	5.56
Total		18	100

Based on table 4, 16.67% (3 people) obtained the score of explosive power of momtong dollyo chagi kick above the average, 22.22% (4 people) on the average, and 61.11% (11 people) below the average.

C. The score of explosive power of momtong dollyo chagi kick on the group of high level flexibility by using plyometric of Standing Jump method.

The score of explosive power of momtong dollyo chagi kick on the group of high flexibility by using plyometric of Standing Jump method, obtained between 12.87 to 13.17, obtained on average by 12.98, standard deviation of 0.10 and frequency distribution as shown in table 5 below.

TABLE V. THE SCORE OF FREQUENCY DISTRIBUTION OF THE EXPLOSIVE POWER OF MOMTONG DOLLYO CHAGI KICK ON THE GROUP OF HIGH FLEXIBILITY BY USING PLYOMETRIC OF STANDING JUMP METHOD.

No	Skor	Frekuensi Absolut	Frekuensi Relatif (%)
1	12.86 – 12.96	5	55.66%
2	12.97 – 13.06	2	22.22%
3	13.05 – 13.16	1	11.11%
4	13.17 – 13.26	1	11.11%
Jumlah		9	100

Based on table 8, 22.22% (2 people) got the explosive power score of momtong dollyo chagi kick above average, 22.22% (2 persons) on the average, and 55.55% (5 persons) below the average.

D. The score of the explosive power of momtong dollyo chagi kick on the group of low level flexibility by using plyometric of Standing Jump method

The score of the explosive power of momtong dollyo chagi kick on the group of low flexibility by using plyometric of Standing Jump method, obtained range between 12.70 to 12.97, obtained average 12.78, standard deviation of 0.09 and frequency distribution as shown in table 6 below.

TABLE VI. THE SCORE OF FREQUENCY DISTRIBUTION OF THE EXPLOSIVE POWER OF MOMTONG DOLLYO CHAGI KICK ON THE GROUP OF HIGH FLEXIBILITY BY USING PLYOMETRIC OF STANDING JUMP METHOD.

No	Score	Absolute frequency	Relative frequency (%)
1	12.69 – 12.79	6	66.67
2	12.80 – 12.89	2	22.22
3	12.90 – 12.99	1	11.11
4	13.00 – 13.09	0	00.00
Total		9	100

Based on table 6, 11.11% (1 person) got the explosive power score of momtong dollyo chagi kick above the average, 22.22% (2 persons) on the average, and 66.67% (6 persons) below the average.

E. The score of the explosive power of momtong dollyo chagi kick on the group of high level flexibility by using plyometric of Box Drill method.

The score of the explosive power of momtong dollyo chagi kick on the group of high level flexibility by using plyometric of Box Drill method, obtained in the range of 12.61 to 12.88, obtained an average of 12.73, a standard deviation of 0.08 and a frequency distribution as shown in table VII below.

TABLE VII. THE SCORE OF FREQUENCY DISTRIBUTION OF MOMTONG DOLLYO CHAGI KICK ON THE GROUP OF HIGH LEVEL FLEXIBILITY BY USING PLYOMETRIC OF BOX DRILL METHOD.

No	Score	Absolute frequency	Relative frequency (%)
1	12.60 – 12.70	4	44.44
2	12.71 – 12.80	4	44.44
3	12.81 – 12.90	1	11.11
4	12.91 – 13.00	0	00.00
total		9	100

Based on table 7, 11.11% (1 person) got the explosive power score of momtong dollyo chagi kick above the average, 44.44% (4 persons) on the average, and 44.44% (4 persons) below the average.

F. The score of the explosive power of momtong dollyo chagi on the group of low level flexibility by using plyometric of Box Drill method.

The score of the explosive power of momtong dollyo chagi on the group of low level flexibility by using plyometric of Box Drill method, obtained range between 12.73 until 13.04, got average 12,86, standard deviation of 0.11 and frequency distribution as seen in table 8 below.

TABLE VIII. THE SCORE OF FREQUENCY DISTRIBUTION EXPLOSIVE POWER OF MOMTONG DOLLYO CHAGI ON THE GROUP OF LOW LEVEL FLEXIBILITY BY USING PLYOMETRIC OF BOX DRILL METHOD.

No	Score	Absolute frequency	Relative frequency (%)
1	12.72 – 12.82	3	33.33
2	12.83 – 12.92	3	33.33
3	12.93 – 13.02	2	22.22
4	13.03 – 13.12	1	11.11
Total		9	100

Based on table 8, 33.33% (3 people) got the explosive power score of momtong dollyo chagi kick above the average,

33.33% (3 persons) on the average, and 33.33% (3 persons) below the average.

G. The influence between the method of plyometric exercise and flexibility on the explosive power of momtong dollyo chagi kick

The score of explosive power of momtong dollyo chagi kick on the taekwondo group that trained by using standing jump and box drill method, both taekwondo that have high formation and taekwondo that have low flexibility, obtained the data that can be seen in table 9 which illustrates the average price.

TABLE IX. THE AVERAGE OF EXPLOSIVE POWER OF MOMTONG DOLLYO CHAGI OF FOURTH GROUP..

Flexibility (B)	The method of Plyometric exercise (A)	
	Standing Jump (A1)	Box Drills (A2)
High (B1)	$\bar{x} = 12.98$	$\bar{x} = 12.73$
Low (B2)	$\bar{x} = 12.78$	$\bar{x} = 12.86$

Based on the data in table 12 above, it can be concluded that the high explosive of the taekwondo in dollyo chagi that has high level of flexibility that trained by using the plyometric standing jump ($\bar{x} = 12.98$) higher than the taekwondo group that trained by using the plyometric of Box Drill ($\bar{x} = 12.73$). On the other hand, the low-learning scores of taekwondo's momtong dollyo chagi that has low level flexibility that trained by using the method of Plyometric of Standing Jump ($\bar{x} = 12.78$) were lower when compared with the taekwondo group trained by the plyometric method of box drills (= 12.86). Therefore, there is an interaction between Plyometric training methods with the ability to burst momtong dollyo chagi.

Based on the results of data analysis, it was found that the research hypothesis which states that there is no difference in the explosive power of the momtong dollyo chagi between the standing jump training method and the box drills training method is failed / rejected. It means that the standing jump training method is better in achieving the goal of the explosive power of momtong dollyo chagi kick when compared to using the box drills training method.

The second hypothesis test, showed the difference in the explosive power of momtong dollyo chagi between the standing jump training method and the box drill training method for the taekwondo group that has high level flexibility.

The third hypothesis test, showed that there is a difference in the explosive power of momtong dollyo chagi kick between the standing jump training method and the box drills training method for the taekwondo group that has a low level flexibility.

While in the fourth hypothesis test, showed the interaction between the Plyometric training method and the flexibility of the momtong dollyo chagi kicking power. Thus, it can be stated that the overall method of standing jump training has a

better effect than the box drills method. While for those who have high level flexibility, they can do the method of standing jump training to increase the explosive power of momtong dollyo chagi kick. While for those who have low level flexibility, they can do Box Drill training method to increase the explosive power of momtong dollyo chagi.

IV. CONCLUSION

Based on the results of the research and hypothesis testing, concluded that overall, there is a significant difference between the standing jumps training method with Box Drills training method to the explosive power of momtong dollyo chagi, for taekwondoin who has a high level flexibility, standing jump training method is better than Box Drill training method to the explosive power of momtong dollyo chagi, for taekwondoin who has low level flexibility, Box Drill training method is better than Standing Jumps training method to the explosive power of momtong dollyo chagi, there is a positive interaction between standing jump training method with the flexibility to the explosive power of momtong dollyo chagi

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