The Effect of Exercise of Forward and Backward Kicks on the Incline towards Legs Power of Taekwondo Tekad Club

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Abstract: This research aims to determine the effect of exercise of forward and backward kicks on the incline towards legs power of Taekwondo Tekad Club. This research used an experimental method with the design of "two groups' pre-test and post-test design". There were 24 members of Taekwondo Tekad Club of Special Region of Yogyakarta selected as the research sample, and the sampling was done by purposive sampling. There were 12 members who met the criteria. The instrument used for measuring leg power was vertical jump test. T-test with significance of 5% was used to analyze the data. The results show that (1) There is a significant influence on the practice of forward kicks on the incline towards leg power of Taekwondo Tekad Club, where the value of t is 7.906> t table is 2.571, and a significance value is 0.001 <0.05, and a percentage increase 4.08%. (2) There is a significant influence on the practice of a backward kick of leg power on the incline of Taekwondo Tekad Club, where the value of t is 3.503> t table is 2.571, and a significant value is 0.017 <0.05, and a percentage increase 3.73%. (3) The forward kick exercise on the incline is better than the backward kick exercise on the incline to increase the athlete's leg power of Taekwondo Tekad Club, with the post-test average difference is 0.17 cm and the increase in the percentage of forward kick exercise is 4.08%.

1 INTRODUCTION

One of the branches of sports that became the attention of the writer this time is Taekwondo. Taekwondo is one of the branches of martial arts using hands and feet wrapped well by applying rules and self-disciplined ethics, thus Taekwondo has an enormous usage in social life. Taekwondo's origin is from Korea and Kukkiwon Seoul, Korea as its Headquarters. Meanwhile the organization for Taekwondo sport branch in Indonesia is *PBTI* (*Pengurus Besar Taekwondo Indonesia*) (Tirtawirya, 2005).

Taekwondo has an ability to develop several biomotoric components that play well when in a match, for example, muscle strength, speed, power explosive, balancing, flexibility, and endurance and skill movement (Tirtawirya, 2005). Furthermore, the psychological quality affects by some factors such as motivation, tension, anxiety, concentration, and attention. Accordingly, biomotoric components are highly needed in optimizing the achievement of the athlete. In Taekwondo's match, kick and punch is highly needed to achieve the points based on the system in the match. One of the techniques mostly done by the Taekwondo in to achieve the points is by doing a series of kicks. The kick that counted by points should have sufficient of certain power. In doing the kick, speed is also greatly needed. Speed is excessively necessitated by an athlete in taekwondo sport branch, as well as an attack kick or a survive kick as explained by Yoyok that: "To do the kicking technique, speed, strength, power and prime balance are required" (Yoyok, 2002). Besides, other things needed are spacing mastery and punctuality along with the precise direction in order to get an effective kick. The speed when doing the kick affects exceedingly in the match to get the scores or points, since the points are easily achieved by the athletes who do the kicks to attack or to survive.

In Taekwondo, the athletes with high leg power benefit more since they can easily apply the techniques during the match. The technique of kicking in Taekwondo, affected much by the power of leg muscle of the athlete. Strength and speed from the espousing group of muscle are required in order to be able to do the kicking technique well.

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From those groups of muscles, the most dominant part that supports through the kick is the power of leg muscle. Therefore, the accurate treatment applied to the athlete should put forward to the leg power.

The ability of the Taekwondo in depends on the conducted exercising process because exercising is one of the ways to advance the capability physiologically and psychologically, the exercise should also be done periodically and in a relatively long duration which then elevated in stages in order to achieve good result (Gandi, 2013). There is a need to conduct modest exercising methods that can elevate the leg power. The success of the Taekwondo in in achieving the top performance is determined by the quality of the exercise. Meanwhile, the quality of the exercise determined mainly by the condition as well as the ability of the coach and the athletes, however, both should have the ability, the willingness, and high commitment to achieve maximum results. (Sukadiyanto, 2011).

The Taekwondo athletes have not achieved the optimal phase in one power exercise. The coaches in The Special Region of Yogyakarta still necessitate the modest leg power exercising model, so that the coaches could apply the model easily in conquest coaching. Based on the background above, hence the researcher is interested to do the research entitled "The Effect of the Inclined Forward and Backward Kick Exercise in through the Leg Power of Tekad Taekwondo Athletes".

2 RESEARCH METHODS

2.1 Research Type

The type of the research is Quasi-Experiment Research. The experimental research is a research that is aimed to understand the existence of the effect throughout the subject treated (Arikunto, 2010). The design of the research is "Two Groups Pre-Test-Post-Test Design".

2.2 Research Time and Place

The research was conducted in Tekad Club in The Special Region of Yogyakarta. This research was performed in February 2019 – March 2019, the exercises of the program were accomplished in 16 meetings, 3 times in 1 week, precisely on Wednesday, Saturday and Sunday.

2.3 Research Target/Subject

The populations of the Tekad Taekwondo Club in The Special Region of Yogyakarta are 24 persons. The sample taking was conducted by purposive sampling. Furthermore, purposive sampling is the sampling technique by certain consideration (Sugiyono, 2007). The criteria in taking the sample were: (1) the exercise attendance of 75% in minimum (the participation to join the exercise during the treatment), (2) the athletes of taekwondo Tekad Club in The Special Region of Yogyakarta, (3) the athletes were willingly to follow the treatment from the beginning to the final, (4) male, and (5) 17-21 years old. Based on the criteria, the respondents chosen were 12 respondents.

2.4 Procedure

The pretest was presented to the respondents holistically to determine the treatment group, ranked based on the pretest results, and then matched by A-B-B-A pattern in two groups, each group consisted of 10 persons. Ordinal pairing is the group distribution divided into two aims to make both group acquired resemblance or well-distributed skill (Sugiyono, 2007). The samples were divided into two groups, Group A was given the forward kick in inclined and Group B was given the backward kick in the inclined.

2.5 Data, Instrument, and Data Collection Technique

The instrument applied for the initial measurement (pretest) as well as final measurement (post-test) was vertical jump test, with the validity of 0.978 and reliability of 0.989 (Widiastuti, 2015). As for the steps of the process were: first, doing the pretest, and then giving the treatment, and doing the posttest afterwards to detect the result of the treatment given. The data collected in this research was pretest data, obtained from the quantities of the vertical jump test acquired by the athletes before the treatment given to the samples, whereas the post-test data obtained from the quantities of the vertical jump test acquired by the athletes after the treatment given to the samples.

2.6 Data Analysis Technique

Before the hypothesis test, the prerequisite test should be done formerly. The result test related to the result of the research. It is aimed to maintain and to gain better analysis. As a consequence, in this research, normality and homogeneity data tests should be completed in this research. Before stepping to the t-test, there are prerequisites that should be fulfilled by the researcher that the analyzed data should be distributed generally, so that the normality and homogeneity tests should be set (Arikunto, 2010).

3 RESULT AND DISCUSSION

3.1 The Description of the Data Result of the Research

The result of the leg power of the Tekad Club's Taekwondo athletes before and after the treatment of forward and backward kick in the inclines were as follow:

Table 1: Pretest and posttest results of leg power of the inclined forward kick group.

Subject No	*Pretest*	*Posttest*	Difference
1	48	49	1
2	44	46	2
3	43	45	2
4	38	39	1
5	37	39	2
6	35	37	2
Mean	40.83	42.50	
SD	4.96	4.81	
Minimum	35.00	37.00	
Maximum	48.00	49.00	

Table 2: Pretest and posttest result of the leg power of the inclined forward kick exercise group.

Subject No	Pre-test	Post-test	Difference
1	45	48	3
2	45	47	2
3	40	41	1
4	39	41	2
5	37	38	1
6	35	35	0
Mean	40.17	41.67	
SD	4.12	5.05	
Minimum	35.00	35.00	
Maximum	45.00	48.00	

3.2 The Result of the Prerequisite Group and Normality Group

The normality test calculation was finished by applying the Kolmogorov-Smirnov Z Formula and the data processing technique by using the SPSS 16 program. The results were served as follow:

Table 3: Normality test.

Group	P	Information
Pretest Group A	0,942	Normal
Posttest Group A	0,787	Normal
Pretest Group B	0,948	Normal
Posttest Group B	0,935	Normal

From the result of table 3, it is able to be perceived that the entire of the data has the score of p (Sig.) >0.05, so the variable distributed normally.

3.3 Homogeneity Test

The norm of the homogeneity is if $p > 0.05$. The result of the homogeneity test of the research can be observed as in table 4:

Table 4: Homogeneity test.

Group	Sig.	Information
Pretest	0.439	Homogeny
Posttest	0.830	Homogeny

From table 4 above, the results of the pretest and post-test were sig. $p > 0.05$ subsequently; the character of the data was homogeny.

3.4 Hypothesis Test Result

The first hypothesis declared that "There is a significant effect in the leg power of Tekad Club Taekwondo athletes through the inclined forward kick exercise." The results were as follow:

Table 5: T-test result.

Group	Mean	t-test for Equality of means		
		t ht	t tb	Sig.
Pre-test	40.83	7.906	2.262	0.001
Post-test	42.50			

Based on the t-test, it can be seen that t count 7.906 and $t_{table\ (df\ 9)}$ 2.571 has significant score of p about 0.001. Thus, t_{count} 7.906 > t_{table} 2.571, and the significant score of 0.001 < 0.05, consequently the

results proved that there was a significant difference. Hence, the alternative hypothesis (Ha) stated "There is a significant effect in the leg power of *Tekad* Club Taekwondo athletes through the inclined forward kick exercise" was acknowledged.

The second hypothesis said "There is a significant effect in the leg power of *Tekad* Club Taekwondo athletes through the inclined backward kick exercise". The results were as follow:

Table 6: T-test result.

Group	Mean	t-test for Equality of means		
		t ht	t tb	Sig.
Pretest	40.17	3.503	2.571	0.017
Posttest	41.67			

From the results of the t-test, it is able to be observed that t_{count} 3.503 and $t_{table\ (df\ 9)}$ 2.571 with the significant score of p is as high as 0.017. Thus, the t_{count} 3.503 > t_{table} 2.571, and the significance score of 0.017 < 0.05, as a result it showed the significant difference. By this manner, the alternative hypothesis (Ha) stated that "There is a significant effect in the leg power of *Tekad* Club Taekwondo athletes through the inclined backward kick exercise", was believed.

The third hypothesis said "The inclined forward kick exercise is better than the inclined backward kick exercise for the leg power of *Tekad* club Taekwondo athlete." The results were as follow:

Table 6: T-test group A and group B

Group	t-test for Equality of means		
	t ht	t tb	Sig,
Imagery Internal	0.290	2.101	0.775
Imagery External			

From the t-test result table above, it can be spotted that t_{count} is 0.349 and $t_{table\ (df\ =10)}$ =2.228, whereas the significance score of p is 0.734. Since t_{count} 0.349 < t_{table} =2.228 and sig, 0.349 > 0.05, which represents that there is not any significant difference. Based on the analysis result, the difference mean of forward kick post-test and backward kick post-test is only 0.17 cm, with the higher percentage of the forward kick exercise, which is 4.08%. Therefore, it demonstrated that the hypothesis (Ha) that said "The inclined forward kick exercise is better than the inclined backward kick exercise for the leg power of *Tekad* club Taekwondo athletes", was accepted.

3.5 Discussion

3.5.1 The Effect of the Inclined Forward Kick Exercise through the Leg Power of Tekad Club Taekwondo Athletes

Based on the outcome of the research, it showed that there is a significant effect in the leg power of the Tekad Club Taekwondo athletes. The effectiveness of leg power progress of Tekad Club Taekwondo athletes boosts 4.08%. Theoretically, the result of uphill exercise offers an effect to the leg power perfection of Tekad Club Taekwondo athletes. "it is done by regular jumping, before the landing, the knee should be bent and brought a little to the front to get better landing on the inclined ground."

The mechanism for the exercise is the eccentric cycle, by preparing the contractile unsure for the concentric cycles. The fiber muscle spindle feels the muscle length in parallel and the stretching acceleration, and then it sends the information to the Central Nervous System (CNS). The thrust of the impulse sends back the information from the CNS to the muscle to ease the shortened-contraction reflects from the stretched muscle. When the muscle shortened actively, the responsible components are CC. Meanwhile, when the muscle actively lengthened, the responsible components that produce the strength are CC, SEC and PEC. If the amortization is lengthened, it experienced the stretching reflects and the energy production departed away without any result. (Clark, 2008). Plyometrics exercise is one of the exercising techniques to develop the explosive power capacity used by all of the sport branches to improve the ability of jumping/hopping by making use of the tendon muscle tissue stretched-shortening cycle and activating the muscle to reach the maximum strength in as short in time as possible. Plyometrics consists of the fast muscle stretch (eccentric act) that followed directly by shortening the similar muscle and join tissue (concentric act). Plyometrics is also known as shorten the stretching exercise or strengthen the exercise or neuromuscular reactive exercise. This is suitable with the statement stated by Bompa that the enhancement of explosive power is the consequence from the improvement of receptor response in the muscle that is the response from muscle spindle and apparatus Golgi (Bompa, 1994). Muscle Spindle is the receptor which sends the signal of the muscle stretching speed and muscle length. Golgi organ is the sensory receptor that sends the information about muscle strains.

The uphill exercise is the type of the exercise that is done on the inclined track or uphill running. In other words, uphill exercise is the inclined track exercise. In this case, (Lee, Ferrigno, Santana, 2005) stated, "Uphill running is the act of the athletes that run uphill with the medium speed perpetually. This exercise is endeavoured to develop the dynamic strength in the leg muscle. If it is observed from the stimulus of foot circle movement, for the inclined running, it will be significantly different from flat running. When ascending, the extensor muscle of foot circle joint will work harder to restrain the load affected by the gravitational force on oblique (diagonal) track. As a consequence, the enlargement occurred inside the muscle fiber and the quantity of the capillary increased, and hence, the quality of foot circle muscle contraction increased. Indirectly, the muscle in foot circle will get use to the heavy load and if the athletes run in flat track, the foot thrust will be stronger.

3.5.2 The Effect of Inclined Backwards Kick through the Leg Power of Tekad Club Taekwondo Athletes

Based on the results of the research, it is shown that there is a significant difference in the leg power of Tekad Club Taekwondo athletes before and after the treatment of inclined backward kick is about 3.73%. The motion in down-hill exercise is performed by running in descend based on the certain repetition and set which determined by paying attention to the working time and resting time. A good exercise is a systematically designed exercise by following the characteristics of the branch of sports and time availability. An exercise will obtain the maximum result is when the exercise follows the systematic rules. This thing is targeted to minimize the accident when performing the exercise. By applying the exercise in stages, this will amplify the physical activities so that the leg power of the athletes will be developed. Besides, the down-hill exercise that performed repetitively will source the elevating activities which pace up the heart and lungs performance to transfer the oxygen to the blood, so it will cause the escalation.

The more resistant and temporal load should be provided to the plyometric exercise program. The load forced the muscle to work in a lofty intensity. The accurate addition to the load is precisely determined by controlling the descend height or fall of the athletes, the load used and the distance. The incorrect addition of load will distract the effectiveness of the exercise or even cause the accident. Accordingly, by using the load that is over the demand, the more resistant load from the plyometric movement will surely increase the power but the production is not always created the explosive power. The extra load in most of resistant of plyometric exercise is momentum force and gravitational force by using the body weight load (Bompa, 1994). Plyometric exercise is one of the types of explosive power exercise which used the very fast muscle contraction and very strong muscle in overcoming the resistance, thus the muscle always indentures well in lengthened or shortened phase in a very fast timing. Plyometrics exercise is fast, explosive and reactive; these types are the characteristics of muscular power work. Plyometrics exercise which is done repetitively will affect to the leg muscle. This exercise is the mixture of strength and power which becomes the dominant part in muscular power, subsequently this exercise is highly recommended to elevate the leg muscle power.

The repetitive and perpetual exercise constructs the adaptation process through the movement, so that it augments the leg muscle power of the athletes. This is caused by the plyometric. This also has some benefits. The remuneration of plyometric exercise are: (a) the speed movement is in higher level of exercise, so that it is so effective and fit to create the certain type of power (far movement speed is better), (b) the risk of muscle accident is lower, so it is more safe when conducting the exercise, (c) the seriousness and truth in doing the exercise program is easier, (d) the addition load elevation is more precise, and suited to the rules, and (e) enabling several members to train simultaneously, so the duration will be more resourceful.

3.5.3 The Comparison between the Inclined Forward Kick Group and the Inclined Backward Kick Group through the Leg Power

According to the analysis, it is confirmed that the inclined forward kick exercise is better than the inclined backward kick exercise through the leg power enhancement of Taekwondo athletes of Tekad Club, with the mean of separation in post-test about 0.17cm and the percentage development of inclined forward kick exercise of 4.08%. The principal of plyometric exercise is the muscle retrenchment as well as in lengthened phase (eccentric) or shortened phase (concentric). The Plyometric exercise is valuable to amplify the muscle nerve reaction, explosive, speed and the capability to generate the

force to certain direction. Plyometric exercise illustrated the characteristics of muscle full strength contraction with the very swift response, dynamic loading or complicated muscle extension (Radcliffe & Farentinos, 2002). Plyometric has several profits, utilize of the force and the speed attained by antigravity body weight acceleration, this occurrence cause the speed force in plyometric exercise that encourage several sport activities such as jumping, running and throwing more often compared to the weight exercise or it can be said to be more vigorous or explosive (Chu, 2000).

That plyometric exercise using the weight in the exercise to advance the power, may not always in the form of external weight which requires some tools such as dumbbell or vest (Bompa, 1994). Conversely, it can also be in the form of the athletes body weights as well, likewise if the athletes trained are still in young ages or amateur. The load of their own bodies like in jumping, hopping, push-up, etc, are able to develop the muscle strength. The above questions are strengthened by the research result of Avery, stated that the additional exercise to the training program increases the muscle strength (Avery, 2007).

The result is also toughened by the research from (Dwi, D.R.A.S, 2018) explained that based on the pretest and post-test outcomes, it can be understood that the experiment group of inclined sprint running exercise affected positively through the long jump result approximately 95.00%. Hill exercise on uphill and downhill slopes has been frequently used by distance runners to advance the mechanical perspective; power represents a rate of performing mechanical work, or a product of force acting upon an object and the object's velocity (Krishan, Sing, & Selvam, 2011). In human movement associated sciences, muscle power is generally considered to be an essential factor that responsible for successful rapid movements performed with maximum effort, including jumping, sprinting, throwing, and kicking.

Observed by the stimulus from the foot circle movement, uphill exercise is extensively different from the flat running exercise. When ascending, the extensor muscle of foot circle joint will work tougher to restrain the load affected by the gravitational force on oblique (diagonal) track. Thus, the enlargement takes place inside the muscle fiber and the quantity of the capillary increased, and as a consequence, the quality of foot circle muscle contraction increased. Indirectly, the muscle in foot circle utilizes the heavy load and if the athletes run in flat track, the foot shove will be stronger.

Downhill method is an exercise descending the hill that is performed by the maximum speed without reducing the rate and oppose the body weight so that it can fabricate the maximum speed. Downhill exercise is aimed to train the frequent speed of the feet movement so it can generate the maximum speed. The downhill exercise is also raised the dynamic strength. The power exercise is done whenever the athletes have built their pace of strength and speed since power is the calibration between strength and speed. The structure of the power movement is always explosive. Thus, all types of exercises in biomotoric components of strength and speed become the power exercise speed, when it is in light intensity until the rapid rhythm (Sukadiyanto, 2011).

4 CONCLUSIONS

Based on the data analysis result, description, and the test result of the research, and discussion, it can be concluded, that:

(a) There is a significant different in inclined forward kick through the leg power of the athletes of *Tekad* club Taekwondo athletes, by t_{count} 7.906 > t_{table} 2.571, and significance score of 0.001 < 0.05, and percentage raise about 4.08%.

(b) There is a significant effect of inclined backward kick through the leg power of the athletes of *Tekad* club Taekwondo athletes by t_{count} 3.503 > t_{table} 2.571, and significance score of 0.017 < 0.05, and the percentage raise of 3.73%.

(c) The inclined forward kick is better than the inclined backward kick through the leg power of *Tekad* Club Taekwondo athletes, with the post-test difference of 0.17 cm and the raise of the percentage in the exercise of inclined forward kick of 4.08.

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