

The Effect of Back up Exercise and Core Stability Exercise on The Strength of the Strike Muscles of Ps Sekongkang Soccer Players Reviewed from Balance



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ABSTRACT: Back Up and Core Stability Exercise are two models that can be used by trainers to increase Togok Muscle Strength. This study aims to find out: (1) the difference in the effect between Back Up and Core Stability Exercise on Togok Muscle Strength; (2) the difference in the effect between athletes who have high and low balance on the Togok Muscle Strength of soccer athletes; (3) Interaction between Back Up Training Model and Core Stability Exercise as well as high and low balance of Togok Muscle Strength of soccer athletes. This type of research is experimental research using a 2x2 factorial design. The population in this study was 38 PS Sekongkang football athletes. The sample in this study amounted to 20 people who were then carried out ordinally pairing to divide each group. The instrument used is to measure strength, namely Back and Leg Dynamometer while balance uses a Modified Bass Test. The data analysis technique used is ANOVA two way. The results showed that: (1) there was a significant difference in the effect between Back Up and Core Stability Exercise on Togok Muscle Strength, as evidenced by a p significance value of 0.001 and an F value of 17.600. Since the significance value of p is $0.001 < 0.05$, it means that H_0 is rejected. (2) there is a significant difference in the effect on high and low balance ability on the Togok Muscle Strength of football athletes, as evidenced by the results that the significance value of p is 0.000 and the value of F is 5.309. Since the significance value of p is $0.000 < 0.05$, it means that H_0 is rejected. (3) There is a significant interaction between Back Up training and Core Stability Exercise on the Togok Muscle Strength of soccer players, as evidenced by the results of a significance value of p of 0.002 and an F value of 21.327. Because the significance value of p is $0.002 < 0.05$, H_0 is rejected. So from the results of the study, it can be concluded that the back up training model and core stability exercise have a significant impact on the results of the shock strength in order to have maximum performance.

KEYWORDS: Back Up, Core Stability Exercise, Punch Strength, Balance, Athlete.

I. INTRODUCTION

The game of soccer is the most phenomenal sport on this earth. Football is the most popular sport in the world and the game is worldwide. In Indonesia itself, there are many professional football clubs that participate in national competitions. In addition, most countries in Europe, South America, Asia, and Africa have a part in the world of football. Football is known internationally as soccer, this sport seems to have become a language of unity for various nations of the world with various historical and cultural backgrounds, as a tool to unite the world that is able to transcend the boundaries of political, ethnic, and religious differences.

Football players must be in good physical condition. According to [1] good physical condition as well as good mastery of techniques can have a considerable influence on having the ability to play football. In the training process, the elements of physical condition occupy the leading position to be trained, which continues to the training of technique, tactics, mentality, and competitive maturity are the overall training targets. Various efforts from coaches in various sports to improve the physical strength of their players or athletes. These efforts include, namely increasing the strength of the strike and improving balance, while on the other hand, in increasing the strength of the strike muscles and increasing dynamic balance, special exercises are needed. One of the exercises to increase the strength of the torque muscles and improve dynamic balance is to provide core stability exercises and Back Up.

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Based on the author's observations on the training process of several football teams in West Sumbawa Regency, during the Porprov preparatory exercise and the preparation of the West Sumbawa Regency league by the West Sumbawa Porprov Football Team and PS Sekongkang (West Sumbawa Regency League 2 Team), information was obtained that the coach's understanding of back up training and core stability exercise was still lacking. To conduct observations, the author used direct observation and interviews with 1 head coach and 4 assistant coaches. The observation results in this study show that in the field there are still coaches who have not provided back up exercises and core stability exercises programmatically. In addition, athletes often experience complaints of low back pain after training, this can be caused by weakness in the index muscles. Back up and core stability exercises lead to increasing the strength of the striking muscles and improving dynamic balance.

Core stability exercise will support the formation of strike power in athletes, especially football players. Core stability exercises are an exercise model that is used with the aim of increasing strength and stability of the center/trunk [2]. Core stability exercises refer to the body's ability to adjust the position and movement of the center of the body. On the other hand, the strength of the togok muscle is a body strength that does not have legs and hands, functioning to train the abdominal muscles and back muscles [3]. The strength of the strike muscle is also a very important component as an effort to increase physical strength as a whole and is the main driver in activities that involve physical strength, especially in football games.

Balance according to [4] is the ability to maintain the neuromuscular system in an efficient position or attitude while we are moving. Meanwhile, according to [5] balance is the ability to maintain the muscular nervous system in an efficient position or posture while moving. Without a good balance, fast movements will lead to an inability to control movements, as a result the risk of falling will be greater and make the player's performance on the field decrease.

Balance exercises in athletes have been shown to lower the risk of falls and injuries. A good balance training program can reduce the risk of injury, so athletes can perform at their best when competing. Balance can be improved by doing core stability exercises. According to [6] the benefits of great core stability exercise are improving strength and balance, lowering back injuries, and maximizing balance and motion from the upper and lower extremities. Core stability exercises are also often used for injury prevention programs and injury rehabilitation exercise therapy. As stated by [7] that core stability exercise is used to improve performance and prevent injuries and is used for exercise therapy to heal low back pain.

In addition to using core stability stability, back up exercises can also provide benefits for balance and strength of the striking muscles. Back up exercises, or plyometric exercises, have a significant positive impact on improving the strength of the strike muscles and dynamic balance in the game of soccer [8]. The main focus of this exercise is on rapid and strong muscle contractions, which are essential for engaging the muscles necessary in explosive movements such as dribbling or making quick changes of direction. The quick jumping and landing movements in back up exercises increase muscle reactivity, while the development of core muscles and body supports helps maintain dynamic balance, a skill that is crucial in carrying out tasks such as dealing with pressure from opponents.

In addition, back up exercises also play a role in improving flexibility and mobility of the body, which is an important aspect to respond to agility to changes in game situations [9]. By measurably integrating back up training into training programs, soccer players can not only improve their general performance on the field, but also reduce the risk of injury through the development of balanced muscle strength and dynamic balance. Therefore, the application of back up training is one of the important strategies in preparing football players for the demands of a dynamic and fast game.

The results of the study [10] found that core stability exercise can improve strike strength and dynamic balance. The results of the study were reinforced by the results of the study [11] which showed that core stability exercise provided a significant influence on balance with an increase of 13.17%. The core is a collection of muscles in the abdomen that look like a cube with abdominal muscles as the front, paraspinal muscles and gluteus muscles in the back, the upper diaphragm, and the lower part is the pelvic floor muscles and hip support muscles. If the core system works efficiently, it will result in proper power distribution, optimal control, and efficiency in motion [12]. The muscles in the core provide the torque or power necessary to make movements, control movements, or to prevent movements from occurring. Stability is an effort to maintain a person's balance in a static or dynamic state. Stabilisation is described by [13] "Stabilisation of the core of mid-section occurs when you maintain a fixed position of the torse while carrying out certain activities or movements of the limb." This means that core or intermediate balance occurs when a person maintains a body position such as doing certain activities or limb movements. Through stabilization exercises, the core part of the body will be trained to remain stable in the middle, which causes it to be more stable in carrying out activities or movements.

Core stability is the ability to control position and movement from the trunk to the pelvis which is used to perform optimal movement, displacement, pressure control, and movement during activity. Core stability is an important factor in postural [14]. Core stability activities will maintain good posture in doing movements and become the basis for all movements in the arms and

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legs and affect body stability. Core stability affects the activity of the muscles in the abdominal area so that stability is created. Core stability activity is influenced by superficial (global) muscles and deep (core) muscles. The superficial (global) muscles and the inner muscles (core) are the main functions for maintaining posture.

Back up training in football is a training method that aims to improve the strength, endurance, balance, and skills of athletes in dealing with certain situations that may occur in the match. According to [15] the main focus of this exercise is to prepare players to cope with any pressure or challenges that may arise during competition, so that they can give their best performance in any conditions. Additionally, back-up exercises can include simulating match scenarios, with athletes having to respond quickly to changes in opponent tactics or other unexpected situations. Back up exercises are exercises to increase back muscle strength. The implementation of backup can be done in two ways, namely static and dynamic. In this form of back muscle strength increase exercise using static back up exercises refers to increasing strength by isometric muscle contraction. On the other hand, in the form of back muscle strength increase exercises using dynamic back up exercises refer to increasing strength by isotonic muscle contractions.

II. MATERIAL AND METHODS

This study is an experimental research using a 2x2 factorial experiment design. In this experimental study, the author used two groups that received different treatments, namely the provision of back up exercises and core stability exercises.

Table 1. Factorial Research Design 2x2

Exercise (A)	Core Stability Exercise (A ₁)	Back Up (A ₂)
Balance (B)		
Tall (B ₁)	A ₁ B ₁	A ₂ B ₁
Low (B ₂)	A ₁ B ₂	A ₂ B ₂

Information:

- A₁B₁: Players with high balance are trained using core stability exercises.
- A₂B₁: Players with high balance are trained using back up exercises.
- A₁B₂: Players with low balance are trained using core stability exercises.
- A₂B₂: Players with low balance are trained using back up exercises.

The population of this study is all athletes or football players of PS Sekongkang in 2023 which totals 38 subjects. The basis for sampling using Ordinal Pairing based on the ranking results is that 27% of players have a high level of balance and as many as 27% of players have a low level of balance, so the sample in this study is 20 samples.

The data collection techniques used in this study are tests and observations. Data collection was carried out by measuring the strength of the torch using a back and leg dynamometer, and measuring the balance using a modified bass test. The data analysis technique used in this study is to use two-way Anava at a significance level of 0.05 with the help of SPSS 20. Before that, it is necessary to carry out a follow-up test, namely the Tukey Test. Before conducting a hypothesis test with the two-way Anava (two-way Anova), prerequisite tests were carried out, namely: (1) normality test and (2) homogeneity test.

III. RESULT AND DISCUSSION

Result

The results of the research and discussion will be presented in order, including: (1) data from the research results, (2) pre-analysis tests, and (3) hypothesis tests.

1. Description of Research Results Data

The data from this study is in the form of pretest and posttest data on the strength of the target muscles. The following are the results of the data presented.

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Table 2. Pre Test and Post Test Strike Muscle Strength – High Balance

No	High Balance Group					
	Back Up			Core Stability Exercise		
	Pre test	Post test	Difference	Pre test	Pos test	Difference
1	176	177	1	176	176	0
2	175	177	2	175	176	1
3	174	177	3	174	175	1
4	173	176	3	173	175	2
5	173	176	3	172	174	2
Mean	174,2	176,6	2,4	174	175,2	1,2

Table 3. Pre Test and Post Test Torque Muscle Strength – Low Balance

No	Low Balance Group					
	Back Up			Core Stability Exercise		
	Pre test	Post test	Difference	Pre test	Pos test	Difference
1	175	179	4	174	177	3
2	174	179	5	174	177	3
3	173	178	5	173	174	1
4	173	177	4	173	174	1
5	172	177	5	172	173	1
Mean	173,4	178	4,6	173,2	172,8	1,8

Table 4. Descriptive Statistics Pre Test and Post Test Muscle Strength

Group	N	Minimum	Maximum	Mean	Standard Deviation
Pretest A ₁ B ₁	5	173	176	174,20	1,304
Posttest A ₁ B ₁	5	176	177	176,60	0,548
Pretest A ₂ B ₁	5	172	176	174	1,581
Posttest A ₂ B ₁	5	174	176	175,20	0,837
Pretest A ₁ B ₂	5	172	175	173,40	1,140
Posttest A ₁ B ₂	5	177	179	178	1,000
Pretest A ₂ B ₂	5	172	174	173,20	0,837
Posttest A ₂ B ₂	5	173	177	175	1,871

2. Analysis Prerequisite Test

The results of the prerequisite test of analysis and hypothesis test are presented as follows.

a. Normality Test

The data normality test in this study was carried out using the Shapiro-Wilk method. The results of the normality test are presented in the table below.

Table 5. Normality Test

Group	P	Significance	Information
Pretest A ₁ B ₁	0,421	0,05	Usual
Posttest A ₁ B ₁	0,320		Usual
Pretest A ₂ B ₁	0,967		Usual
Posttest A ₂ B ₁	0,314		Usual
Pretest A ₁ B ₂	0,814		Usual
Posttest A ₁ B ₂	0,119		Usual
Pretest A ₂ B ₂	0,314		Usual
Posttest A ₂ B ₂	0,132		Usual

Based on the statistical analysis of the normality test that has been carried out using the Shapiro-Wilk test, in all pretest and posttest data of the strength of the strike muscles, the results of the normality test data have a significance value of $p > 0.05$, which means that the data is normally distributed.

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b. Homogeneity test

The homogeneity test in this study is the Levene Test. The results of the homogeneity test are presented in the table below.

Table 6. Homogeneity test

<i>Levene Statistic</i>	<i>df1</i>	<i>df2</i>	<i>Sig.</i>
2,320	7	32	0,049

Based on the statistical analysis of the homogeneity test that has been carried out using the Levene Test, a significance value of $0.049 \geq 0.05$ was obtained. Thus the population has the same variants or is homogeneous.

3. Hypothesis testing

The test of the research hypothesis was carried out based on the results of data analysis and interpretation of the two-way Anava analysis. The following results of the hypothesis test are presented in the table below.

- a. The Effect of Back Up Exercise and Core Stability Exercise on the Strength of the Strike Muscles of PS Sekongkang Football Players.

Table 7. Anava Test Results of Back Up Exercise and Core Stability Exercise

<i>Source</i>	<i>Type III Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Exercise Methods	24,200	1	24,200	17,600	0,001

From the table above, it can be seen that the significance value of p is 0.001 and the value of F is 17.600. Because the significance value of p is $0.001 < 0.05$. Thus there is a significant difference in influence. Based on the results of the analysis, it turned out that the core stability exercise group of 177.30 was higher than the back up group of 175.10.

- b. The Effect of High Balance and Low Balance on the Increase in Muscle Strength of PS Sekongkang Soccer Players.

Table 8. Anava Test Results High Balance and Low Balance

<i>Source</i>	<i>Type III Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Balance	1,800	1	7,800	5,309	0.000

From the table above, it can be seen that the significance value of p is 0.000 and the value of F is 5.309. Because the significance value of p is $0.000 < 0.05$. Thus there is a significant difference in influence. Based on the results of the analysis, it turned out that the group that had a high balance of 176.50 was higher than the low balance group of 175.90.

- c. Interaction of Back Up Exercise and Core Stability Exercise as well as High Balance and Low Balance with Increased Muscle Strength of PS Sekongkang Football Players.

Table 9. Anava Test Results of Back Up Exercise and Core Stability Exercise Interaction

<i>Source</i>	<i>Type III Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Exercise Methods and Leg Power	3,200	1	18,200	21,327	0,002

From the table above, it can be seen that the significance value of p is 0.002 and the value of F is 21.327. Because the significance value of p is $0.002 < 0.05$. Based on these results, it can be concluded that there is an interaction of back up training and core stability exercise as well as high balance and low balance with an increase in the strength of the strike muscles of PS Sekongkang football players.

After being tested that there is an interaction between back up exercises and core stability exercises as well as high and low balance with increased strength of the striking muscles, it is necessary to carry out further tests using the Tukey test. The results of the advance

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Table 10. Summary of Post Hoc Test Results

Group	Interaction	Mean Difference	Std.Error	Sig.
A ₁ B ₁	A ₂ B ₁	1,400	0,742	0,272
	A ₁ B ₂	-1,400	0,742	0,272
	A ₂ B ₂	1,600	0,742	0,178
A ₂ B ₁	A ₁ B ₁	-1,400	0,742	0,272
	A ₁ B ₂	-2,800*	0,742	0,008
	A ₂ B ₂	0,200	0,742	0,993
A ₁ B ₂	A ₁ B ₁	1,400	0,742	0,272
	A ₂ B ₁	2,800*	0,742	0,008
	A ₂ B ₂	3,000*	0,742	0,005
A ₂ B ₂	A ₁ B ₁	-1,600	0,742	0,178
	A ₂ B ₁	-0,200	0,742	0,993
	A ₁ B ₂	-3,000*	0,742	0,005

DISCUSSION

This study not only explored the impact of each exercise separately, but also looked at how the interaction between the two exercises and the athlete's balance level affected the increase in the strength of the striking muscles. The torque muscle, or often referred to as the core muscle, has a crucial role in the performance of athletes, especially in football which requires complex body movements and stability in carrying out various movements [16]. Therefore, an in-depth understanding of the effects of exercise and balance on the torque converter can provide valuable insights into designing an effective training program to improve the performance of soccer athletes.

Back up exercises and core stability exercises are two types of exercises that are often used in the development of the strength of the hammer muscles. Back up exercises, or also known as back exercises, focus on strengthening the muscles that play a role in maintaining good posture and supporting upper body movements [17]. Meanwhile, core stability exercise is focused on strengthening the core muscles including the abdomen, waist, and pelvis, which play an important role in maintaining overall body stability [18]. Both types of exercise have been shown to be effective in increasing the strength of the strike muscles in different types of athletes, including soccer athletes.

The importance of the strength of the strike muscles in the performance of football athletes cannot be underestimated. Strong strike muscles can help athletes maintain body balance when performing various movements such as kicking, running, and dribbling. In addition, optimal torque muscle strength can also reduce the risk of injury, especially in the back and hips, which are often susceptible to injury in soccer athletes [19]. Therefore, increasing the strength of the strike muscles through back up exercises and core stability exercises is a priority in athletes' physical training programs.

However, it is important to consider not only the effectiveness of each exercise, but also how the interaction between the two and additional factors such as the athlete's balance level can affect the final result. The combination of back up and core stability exercises can give better results than just doing one type of exercise. This is because the two types of exercise complement each other in strengthening the muscles that play a role in maintaining overall body stability [20]. In addition, the interaction between these exercises can also accelerate the body's adaptation process to exercise and increase efficiency in the development of the strength of the strike muscles.

Athletes' balance levels also have a significant role in increasing the strength of the index muscles through back up exercises and core stability exercises. Athletes who have high balance tend to have better control in carrying out body movements and holding a stable body position [21]. On the other hand, athletes who have low balance may have difficulty maintaining body stability when performing exercises that require good control of the index muscles. Therefore, it is important to pay attention to the level of balance of athletes in designing an appropriate training program so that the results can be maximized.

The interaction between back up training and core stability exercise with the level of athlete balance is an important focus point in this study. By understanding how these two factors are interconnected, a deeper insight into the mechanisms underlying the increase in torque muscle strength in soccer athletes can be gained. Athletes who have high balance tend to benefit more from exercises that require body stability, including back up exercises and core stability exercises. This is because they can carry out movements more precisely and efficiently, thus maximizing the stimulus provided by the exercise to the index muscles. Athletes who have low balance can also experience a significant increase in the strength of the index muscles through proper exercises. While it may take more time and effort to master these movements, athletes with low balance can still optimize their

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strike muscle potential through consistent and targeted training. Therefore, it is important for trainers and training program developers to pay attention to the individual characteristics of each athlete in designing a suitable training program.

It should be understood that the strength of the strike muscles is not only related to the ability to maintain body stability, but also affects various other aspects of the performance of football athletes. The strike muscles not only play a role in maintaining good posture, but also in transferring power from the lower part of the body to the upper part when performing movements such as kicking or dribbling. Therefore, an increase in the strength of the striker muscle can contribute to an increase in strength and explosiveness in performing various movements on the field [22].

Back up exercises and core stability exercises have different approaches to developing the strength of the striking muscles. Back up exercises focus more on strengthening the muscles around the spine, including the muscles of the back, waist, and pelvis. These exercises often involve movements such as deadlifts, back extensions, and lat pull-downs, which aim to strengthen the main muscles that support posture and upper body movement. On the other hand, core stability exercise prioritizes strengthening core muscles which include the abdominal, waist, and pelvic muscles. Exercises such as plank variations, Russian twists, and bird dogs are often used to strengthen these muscles and improve the athlete's ability to maintain body stability when performing complex movements.

The strength of the striking muscles of soccer athletes, a combination of back up training and core stability exercise is an effective strategy. The two complement each other in strengthening the muscles that play a role in maintaining body stability and transferring energy. For example, back up exercises that strengthen the back and waist muscles can increase strength in kicking a ball or maintaining posture when colliding with an opponent. Meanwhile, core stability exercises that strengthen the core muscles can help improve body control and stability when performing movements, such as running or dribbling.

IV. CONCLUSION

Based on the results of the above study, it can be concluded that back up training and core stability exercise on increasing the strength of the striker muscles of football athletes are not only influenced by the effectiveness of each exercise, but also by the level of balance of athletes. The interaction between these two factors can provide valuable insights in designing effective and efficient training programs to improve athletes' performance. Therefore, it is important for coaches and training program developers to pay attention to the individual characteristics of each athlete and tailor the training program according to their needs and abilities. With the right and consistent approach, athletes can reach their maximum potential in their careers in the world of football.

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