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THE PROFILE COUNTERMOVEMENT JUMP ON LEAGUE 3 BANGKA BELITUNG FOOTBALL ATHLETES

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Abstract
Football is a sport played in teams of 11 players which is done by kicking the ball into the opponent's goal with the aim of scoring goals to get victory. CMJ is an easy, practical, and reliable strength test of the lower limbs, as well as being the obvious choice as a method for measuring and monitoring athletes' performance. The purpose of this study was to determine the profile of the countermovement jump test of Belitong FC football athletes. This research uses descriptive research with a quantitative descriptive approach. The data obtained will be analyzed using SPSS 21. The results of this study showed that the jumping height of Belitong FC football athletes was included in the medium category with an average value of 36.581 cm, the explosive power of the leg muscles was in the medium category with an average value of 3,393.93 W, the eccentric style was included in the medium category with an average value of 1,364 N, and concentric force is also included in the medium category with an average value of 1,488.70 N. As for landing asymmetry, there are 9 athletes who have a high risk of injury. This study encourages athletes to further improve physical condition, especially lower extremity strength so as to improve athlete performance.

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INTRODUCTION

Football is a sport played in teams of 11 players which is done by kicking the ball into the opponent's goal with the aim of scoring goals to get victory (Ridlo & Saifulloh, 2019). In Indonesia, football has grown rapidly. This is evidenced by the existence of a competition called Liga Indonesia (Romadhan, 2018). Competitions in Indonesia start from regional levels to the highest castes, namely Liga 1, Liga 2, and Liga 3 (Handayani, 2022). To sail the competition, good athlete performance is needed. Performance is the ability possessed by an athlete both in physical condition and how to play. This will be considered by the coach whether the athlete is worthy of being included in the team or not (Putra, 2022).

The physical components that soccer athletes must have are explosive power, strength, endurance, speed, flexibility, coordination and agility (Adyasta, 2018). One of the indispensable physical components in football is power. Explosive power is a combination of power and speed. An athlete is said to have good explosive power if he can do strenuous activities or activities in a short time (Gołaś, Maszczyk, Zajac, Mikołajec, & Stastny, 2016). Movements in soccer that require explosive power are when kicking the ball (shooting), heading the ball (heading), and other activities that require athletes to move quickly with maximum strength as well (Acharogiannis, Kordilis, & Mirniotou, 2014).

Belitong FC is a football team from Bangka Belitung that competes in the Liga 3 zone of Bangka Belitong. The highest achievement achieved by this team is qualifying for the last 32 phase of the National League 3 (Yerimon, 2022). In the round of 32, when the opponent had agility, the Belitong FC players were not fast enough to make a counter-movement. This shows

that the strength of the lower extremities or the explosive power of the limb muscles of the players is still lacking. It is necessary for the coach's understanding of this to provide a lower limb muscle strength training program to his players. Because the majority use the muscles of the lower limbs in the game of football (Rendi Putra, Puspodari, & Firdaus, 2021).

Countermovement jump (CMJ) is one of the tests that can be used to measure the strength of the lower leg muscles. CMJ is an easy, practical, and reliable strength test of the lower limbs, as well as being the obvious choice as a method for measuring and monitoring athletes performance (S. McErlain-Naylor, King, & Pain, 2014). Countermovement jump is a vertical jump test that is widely used by coaches or researchers to assess the strength of the athlete's lower leg muscles (Ghedini Gheller, Dal Pupo, Pereira de Lima, Monteiro de Moura, & dos Santos, 2014). Vertical jumps contribute to athletes' performance especially in the sport of soccer. Based on previous studies, this emphasizes the importance of coordination of many joints and muscles (Abdel Rahman, 2013).

In sports, the biomechanics approach is seen from the behavior of objects (athletes) and other sports equipment that supports athlete performance (Rahadian, 2019). Countermovement jump is a vertical jump which is also one of the most frequently used measuring instruments for the results of maximal anaerobic strength and lower extremity strength. This movement uses eccentric and concentric forces resulting from coordination between the torso, hips, knees, and ankles (Laffaye, Philip, & Tombleson, 2014). The movement in CMJ begins with a standing position with hands at the waist. Then perform flexion movements in the hip joint, dorsal flexion in the ankle, and flexion in the knee. When flying or upward movements, the pelvic joint extensions and lifts the torso, the knee joint extensions, the shoulder joint is in anteflexion, and the ankle flexion is plantar. In the landing phase the position of the flexion hip joint, flexion knee joint, and dorsal flexion ankle. Then ended the standing position again (Struzik, 2019). Recent research proves the perception that athletes' neuromuscularity can be analyzed through a curve of CMJ test results. Therefore, the CMJ test is the right measuring tool for athletes who follow explosive sports such as football, rugby, basketball, and volleyball (McMahon, Suchomel, Lake, & Comfort, 2018).

From the CMJ test can find out the height of the jump, the strength of the explosive power of the leg muscles, eccentric force, concentric force. Thus, this test is the right choice compared to other explosive power tests (Prasetya, Firmansyah, Rahman, Oktavian, & Aziz, 2022). From research (Van Hooren & Zolotarjova, 2017) said that CMJ has several variables that can be known, such as jump height, maximum force, pressure, eccentric force, and concentric force.

METHODS

This research uses descriptive research using a quantitative descriptive approach whose results will describe each variable in the countermovement jump. (CMJ) test in the form of numbers. The descriptive selection in this study was based on research that wanted to examine and see the countermovement jump (C.M.J.) test by football athletes. This study used a force desk test, using the countermovement jump test. Data analysis using descriptive, with a total sample of 27 football athletes from the Belitong FC team. Data retrieval performed in KineticX Lab. Data retrieval techniques are obtained by exporting CMJ test result data into table form which is then analyzed using SPSS 21. The Countermovement jump variabels are jump height, power, eccentric force, concentric force, and asymmetry landing. From some of the variables above, each of the data obtained will be described.

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RESULT AND DISCUSSION

The following are some of the results of research that has been done, including some variables present in the countermovement jump test.

Tabel 1. Countermovement jump test

Variable	N	Min.	Max.	Range	Mean	Std. Deviation
Jump Height	27	27,5	45,6	18,1	36,581	4,4160
Power	27	2128	4094	1966	3393,93	436,072
Eccentric Force	27	950	1807	857	1364	253,254
Concentric Force	27	1016	1832	816	1488,70	177,235
N Valid (listwise)	27					

Based on the data analysis above, the following are the results of Jump Height , Power , Concentric Force , Eccentric Force ,and asymmetry landing. as follows, the amount of data in this study is 27 football athtletes Belitong FC. The average value of jump height is 36.581 cm with a minimum value of 27.5 cm and a maximum value of 45.6 cm. While the range is 18.1 cm and the standard deviation from the jump height is 4.4160. Then, power obtained an average value of 3,393.93 W with a minimum value of 2,128 W and a maximum value of 4,094 W. While the range is 1,966 W and the standard deviation from the power is 436.072. For eccentric force results, the average value is 1,364 N with a minimum value of 950 N and a maximum value of 1,807 N. While the range is 857 N and the standard deviation of the eccentric force is 253.254. Furthermore, for concentric forces, an average value of 1,488.70 N is obtained with a minimum value of 1,016 N and a maximum value of 1,832 N. While the range is 816 N and the standard deviation of the eccentric force is 177.235.

Tabel 2. Data of Asymmetry Landing

No	Percentage	Frequency	
		Left	Right
1.	< 15% (less than 15%)	10	8
2.	> 15% (more than 15%)	2	7
Total		**12**	**15**

Based on table 2. shows that there are 18 athletes who have a low risk of injury because the percentage is still below 15%, in addition there are 9 athletes who have a high risk of injury because the percentage is above 15%. From these data, it can be explained that athletes who have a dominant left foot there are 12 athletes with details of 10 athletes with a low risk of injury and 2 athletes with a high risk of injury. While athletes who have a dominant right foot there are 15 athletes with details of 8 people with low risk of injury and 7 athletes with high risk of injury.

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Tabel 3. Distribution frequency of jump height

No	Class Interval	Frequency	Precentage	Category
1.	X ≥ 43,20	4	14,8 %	Very good
2.	38,78 ≤ X < 43,20	4	14,8 %	Good
3.	34,38 ≤ X < 38,78	12	44,5 %	Medium
4.	29,96 ≤ X < 34,38	6	22,2 %	Less
5.	X < 29,96	1	3,7 %	Very less
Total		**27**	**100 %**	

In Belitong FC soccer athletes, the maximum jump height is 45.6 cm which can be categorized as very good, while the lowest value is 27.5 which is included in the category of less once. The majority of Belitong FC athletes are in the medium category for jump height. This is evidenced by the presence of 12 athletes whose jump height is in the medium category and also the average value of jump height from all athletes is 36.581 cm. This result is reinforced by research from (Pasaribu, 2020) where the jump height which is at 31-40 cm is included in the medium category. In addition to other studies found that jump height can affect the speed of athletes, the higher the jump, the faster the athlete moves. This is in line with research (S. A. McErlain-Naylor & Beato, 2022) which explains that the correlation between jump height and individual speed is positive.

Tabel 4. Distribution frequency of power

No	Class Interval	Frequency	Precentage	Category
1.	X ≥ 4.048,03	1	3,7 %	Very good
2.	3.611,96 ≤ X < 4.048,03	7	25,9 %	Good
3.	3.175,9 ≤ X < 3.611,96	11	40,8 %	Medium
4.	2.739,83 ≤ X < 3.175,9	6	22,2 %	Less
5.	X < 2.739,83	2	7,4 %	Very less
Total		**27**	**100 %**	

In the variable power of Belitong FC football athletes, 2 athletes are included in the less than once category, 6 athletes are in the less category, 11 athletes are in the medium category, 7 athletes are in the good category, and only 1 athlete is included in the very good category. This needs to be considered by the coaching team to continue to provide training programs that can increase the explosive power of the leg muscles of their players because most Belitong FC athletes have their leg muscle explosive power in the medium category. The average power value of Belitong FC athletes is 3,393.93 W, with a minimum value of 2,128 W and a maximum value of 4,094 W. from the analysis of the power of Belitong FC athletes above is in line with research (Rendi Putra dkk., 2021) which states that the average leg muscle power of SSB Putra Perseta'88 athletes is in the medium category, therefore it is necessary to improve leg muscle training performance in order to produce better physical condition in facing competition.

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Tabel 5. Distribution frequency of eccentric force

No	Class Interval	Frequency	Precentage	Category
1.	X ≥ 1.743,88	1	3,7 %	Very good
2.	1.490,62 ≤ X < 1.743,88	9	33,3 %	Good
3.	1.237,38 ≤ X < 1.490,62	9	33,3 %	Medium
4.	984,12 ≤ X < 1.237,38	5	18,6 %	Less
5.	X < 984,12	3	11,1 %	Very less
Total		**27**	**100 %**	

In the eccentric force variable of Belitong FC football athletes, there are 9 athletes who fall into the medium category and 9 athletes in the good category. In this case, the muscle strength of Belitong FC athletes is still not optimal. This is evidenced by the average value of the eccentric style, which is 1,364 N, which is included in the medium category. The minimum eccentric style value in Belitong FC athletes is 950 N and the maximum value is 1,807 N. This eccentric force is needed by football players because in football it takes fast movements accompanied by maximum muscle strength. This is reinforced by research from (Az-zahra & Ichsani, 2016) which explains that when eccentric contractions occur, muscles will lengthen by releasing all their strength, but in a short time.

Tabel 6. Distribution frequency of concentric force

No	Class Interval	Frequency	Precentage	Category
1.	X ≥ 1.754,55	2	7,4 %	Very good
2.	1.577,31 ≤ X < 1.754,55	6	22,2 %	Good
3.	1.400,09 ≤ X < 1.577,31	10	37 %	Medium
4.	1.222,85 ≤ X < 1.400,09	8	29,7 %	Less
5.	X < 1.222,85	1	3,7 %	Very less
Total		**27**	**100 %**	

In addition to eccentric contractions, the countermovement jump test can also detect the strength of concentric forces. In Belitong FC soccer athletes, the average concentric force is 1,488.70 N with the lowest value of 1,016 N and the highest value of 1,832 N. in the analysis results most Belitong FC athletes are in the medium category in measuring concentric force. This needs to be considered by the coach, because there are 10 athletes (37%) of the total players who fall into the medium category. These concentric contractions are necessary when the athlete fights the prisoner and muscle shortening occurs. This is reinforced by research from (Kuncoro, 2018) which says that concentric contractions are heavier than eccentric contractions because concentrence requires all muscle fibers.

In the asymmetry of landing Belitong FC football athletes, there are 9 athletes who have a high risk of injury. This is because the percentage of foot imbalance is more than 15%. Where 2 athletes are more left-dominant and 7 athletes are right-dominant. Use that is too dominant is also not too good because it can trigger injury to the athlete. This is reinforced by research (Paul, Oliver, De Ste Croix, Myer, & Lloid, 2018) which explains that the number of coordination movements in soccer can cause differences in muscle strength and joint range of motion, thus creating asymmetries that can cause injury in the long term. With so important the coach to pay attention to the physical condition of his athletes to avoid injury. In addition, this is in line with research from (Bishop dkk., 2019) which explains that it is important for

coaches to group their players with the aim of diagnosing the level of injury risk and making the right training program.

This Countermovement jump test is also different from jump tests in general which can only be known jump height. In addition to jump height, by conducting a CMJ test, it can be known the power, eccentric force, concentric force, and asymmetry landing. This test has also been tested valid with numbers that appear directly in the application, so this test is very helpful for coaches to improve the quality of their players. This is reinforced by research from (Prasetya et.al., 2022) and (Pedro Jiménez, Samozino, Fernando Pareja, Conceição, & Víctor Cuadrado, Peñafiel Juan José González, Badillo Jean, 2016) which states that the countermovement jump test is more reliable than other jump tests because this method is valid and suitable for measurement in athletes who require high muscle explosive power.

Conclusion

It can be concluded that the maximum value of the countermovement jump test of Belitong FC football athletes on the variable jump height is 45.6 cm, leg muscle explosive power is 4,094 W, eccentric force is 1,807 N, and concentric force is 1,832 N. As for landing asymmetry there are 9 athletes who have a high risk of injury. From the value obtained from the test, the jump height of Belitong FC football athletes is included in the medium category with an average value of 36.581 cm, The power is in the medium category with an average value of 3,393.93 W, the eccentric force is included in the medium category with an average value of 1,364 N, and the concentric force is also in the medium category with an average value of 1,488.70 N.

Thus, this countermovement jump test can determine the profile of each athlete so that the coaching team can arrange a training program according to the athlete's needs. Because in this CMJ test can be known the height of the jump, the power, eccentric force, concentric force, and asymmetry landing. This makes the CMJ test a reliable test for sports that require high explosive leg muscle power.

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