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Study of Sprint and Vertical Jump for Indonesian Athletes: Multi-Sectorial Testing

Estudio de carrera corta y salto vertical para atletas indonesios: pruebas multisectoriales

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ABSTRACT

Throughout the world, many coaches and physical education teachers do not give importance to the evaluation of the physical capacities of athletes, and poor performance. This study is carried out to determine the speed and muscle power of the athletes' lower limbs. With regard to muscle speed, all the athletes evaluated were in the middle category. In conclusion, for any sports activity, we need speed and muscle power. That is why coaches and athletes need to develop all physical qualities such as speed, muscular power, strength, agility, muscular and cardiovascular endurance to obtain high performance.

Keywords: Multi-sectorial test, muscle power, muscle speed, physical fitness.

RESUMEN

En todo el mundo muchos entrenadores y profesores de educación física no le dan la importancia a la evaluación de las capacidades físicas de los deportistas, y el bajo rendimiento. Este estudio se realiza para determinar la velocidad y potencia muscular de las extremidades inferiores de los atletas. En lo que respecta a la velocidad muscular, todos los deportistas evaluados se encontraban en categoría media. En conclusión, para cualquier actividad deportiva, necesitamos velocidad y potencia muscular. Es por eso que los entrenadores y atletas necesitan desarrollar todas las cualidades físicas como velocidad, potencia muscular, fuerza, agilidad, resistencia muscular y cardiovascular para obtener un alto rendimiento.

Palabras clave: Aptitud física, potencia muscular, test multisectorial, velocidad muscular.

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INTRODUCTION

Several models for defining sports performance coexist and differ slightly according to the scientific sensibilities of authors and as well as according to the disciplines envisaged (Ahmad & Sahar: 2019, pp. 1540-1543; Fahmi et al.: 2019, pp. 27-38). Physical fitness test very often considered as a method of evaluation in itself because it directly confronts the athlete with his objective; it is nevertheless accepted that sports performance should rather be considered as the result of factors related to the athlete himself (dimensions morphological and biological), its practice (biomechanical and psychomotor dimensions), and its environment (environmental and emotional dimension); (Lambert: 2006, pp. 199-208; Siswantoyo et al.: 2018, pp. 167-174; Peterson: 2018, pp. 60-76; Issn & Khusus: 2020).

The evaluation of these parameters, the confrontation with the requirements of the sporting practice and with the standards already obtained will, ultimately, guide the athlete in the planning and construction of his training. In another register, the evaluations reproduced transversely on a group of subjects will make it possible to build useful standards in the detection of young talents and, possibly, the selection of athletes (Hernández et al.: 2009; Gonçalves et al.: 2012; Villalobos: 2015; Den Hartigh et al.: 2018). In this article, we will mainly address the evaluation of characteristics that have a direct relationship with the different physiological aspects of physical performance: muscle speed and muscle power of lower limbs. As speed and muscle power are the physical capacities which are needed or usefully in many different sport branches like football, basketball, volleyball, pencak silat, rugby, judo, karate, athletic competition, cycling, wood ball, handball, climbing (Ahmad & Ahmad: 2019, pp. 746-778; Jankovska et al.: 2018).

The practice of any sport requires many physical, technical, strategic and psychological. The analysis of the sports discipline is a prerequisite for any evaluation in order to select the most relevant parameters that can be the subject of a specific evaluation. In other words, the choice of tests must be made in good coherence with the type of discipline envisaged and the specific requirements of each (Pankhurst & Collins: 2013, pp. 83-97).

The purpose of this test is to determine acceleration, maximum running speed and speed endurance, depending on the distance run. Equipment required: measuring tape or marked track, stopwatch or timing gates, cone markers. Sprint or speed tests can be performed over varying distances, depending on the factors being tested and the relevance to the sport. The 40 Meter Sprint is part of the eTID Talent Identification Testing Program, and their protocol is listed here. purpose: The aim of this test is to determine acceleration and speed (Young et al.: 2008, pp. 199-206; Wibowo Eko Yulianto et al.: 2019, pp. 305-309; Ahmad & Ahmad: 2018, pp. 44-49).

The vertical jump is a tool for more than just jumping. It increases the explosive strength of your body and the ability to use your strength and it also helps to show your power in your sport. In the world of sport the vertical leap is a way for coaches of measuring what kind of sportsmen they have in their team (Juniarta & Siswantoyo: 2014, pp. 88-105). However, Sports help athlete develop fitness of athletes. Participating in athletics at an early age instills physical fitness habits that carry over into adulthood, helping to avoid health problems. To achieve the good performance needs to be assessed in many ways like to improve all the physical fitness of athlete, the reason why the athlete's progress needs to be evaluated before and after training. Indonesia is characterized by many sports but on the other hand one note that in the province of Yogyakarta the evaluation of physical qualities is seldom evaluated. given the importance of muscle speed and muscle power on the performance of athletes this research will focus on the knowledge of the level of muscle speed and muscle power of athletes from different sports.

METHODS

This research is a descriptive learns about with quantitative approach. The lookup sampling used to be 41 athletes from six special activity disciplines like volleyball, judo, pencak silat, cycling, climbing, and female rugby. All the topics had been taken via random sampling. Data collection with playground test: (1) sprint check (30 m); (2) vertical jump to check the muscle power. Data had been analyzed in the descriptive structure and proportion.

Procedure of speed test

To assess this physical quality, 30 meters as a distance was used to assess the muscle speed of the lower limbs. Athlete had three times to try the distance, and the best result was taken into account. 3 minutes of rest between each test were granted. These tests took place in outdoor playground. The athletes were all wearing sport shoes adapted. All athletes took the tests in the same order, namely the test of 30 meters in a straight line.

Procedure vertical jump

Two types of jumps were evaluated: - the squat jump (SJ) with start flexed at 90° and hands on the hips. - the counter-movement jump (CMJ) with starting knees extended, bending up to 90°, extension knees followed by jumping, all with hands on hips. Three to four attempts for each type of jump were made by asking the athlete to jump as high as possible. The best essay at the SJ and then at the CMJ was selected. The athlete had a minute of rest between each trial.

RESULTS

In this search the results are presented in the form of a table and are deducted as a percentage. The results will then be compared by standard measurements of researchers like Ruffier and others to stratify or know the level of capacities that the Indonesian athletes have on the qualities of the Speed and the muscular power of the lower limbs. Below is presented the Ruffier' vertical jump indicator to assess the low limbs' power (Ruffier & Bernoux: 1975, pp.41-65) From 45 to 55 cm, medium; From 55 to 65 cm, good; 65+, excellent

The speed will be compared on the researchers 'standards value. We are going to rely on the next standards administered by Ruffier and Bernoux (1975). Table1. Result from Sprint and Vertical Jump Test to Assess Speed and Muscle Power.

		Cycling	Volleyball	Climbing	Pencak	Rugby	Judo
Normal Parameters ^{a,b}	Mean	49.5714	70.8571	50.0000	55.5714	44.0000	45.0000
	Std. Deviation	9.08950	7.35818	7.65942	7.97615	8.64099	15.55635
Most Differences	ExtremeAbsolute	0.233	0.237	0.266	0.198	0.350	0.189
	Positive	.184	0.202	0.266	0.198	0.350	0.167
	Negative	-0.233	-0.237	-0.120	-0.140	-0.209	-0.189
Test Statistic		0.233	0.237	0.266	0.198	0.350	0.189
Asymp. Sig. (2-tailed)		0.200 ^{c,d}	0.200 ^{c,d}	0.144 ^c	0.200 ^{c,d}	0.010 ^c	0.200 ^{c,d}
Monte Carlo Sig. (2-	Sig.	.768 ^e	.753 ^e	0.614 ^e	0.902 ^e	0.289 ^e	0.926 ^e

a. Test distribution is Normal.

Table1. Normality Test of Jump data from different disciplines by One-Sample Kolmogorov-Smirnov Test

The Kolmogorov-Smirnov test (K-S) and Shapiro-Wilk (S-W) test are designed to check normality through comparing your facts to an everyday distribution with the same mean and standard deviation of your sample. If the look at is NOT significant, then the data are normal, so any price above 0.05 suggests normality. In conclusion all the data had been normal dispensed

Discipline	Subjects	Sprint Test m/sec	Decision/ Sprint Test	Vertical Jump Test cm	Decision/ Vertical Jump Test
Cycling	7	4.27	All are medium	56	Good
		4.35		56	Good
		5.54		36	Low
		4.95		38	low
		4.53		52	Low
		4.24		50	Low
		4.37		59	Good
Volleyball	7	4.16	All are medium	56	Good
		4.20		74	Excellent
		5.09		77	Medium
		4.24		68	Excellent
		4.37		70	Excellent
		4.16		74	Excellent
		4.20		77	Excellent
Climbing	7	4.35	All are medium	64	Excellent
		5.06		49	Low
		4.26		56	Good
		4.61		45	Medium
		5.16		47	Medium
		5.12		48	Medium
		5.19		41	Low
Pencak Silat Indonesian Martial Art	7	4.62	All are medium	44	Low
		4.40		66	Excellent
		4.39		64	Good
		4.33		60	Good
		4.49		53	Medium
		4.73		51	Medium
		4.41		51	Medium
Female Rugby	7	4.96	All are medium	41	Low
		5.25		41	Low
		4.78		39	Low
		5.08		48	Medium
		5.42		40	Low
		5.17		37	Low
		4.45		62	Good
Judo	7	6.96	All are medium	21	Low
		4.47		60	Good
		4.48		56	Good
		4.99		48	Medium
		7.36		27	Low
5.36	59	Good			
4.73	44	Low			

Table 2. Result from Sprint and Vertical Jump Test to Assess Speed and Muscle Power

The deep analysis of the table so high was to conceive if the trainings made by the trainers to the athletes allow them the improvement of the speed and the muscular power. The evaluation of muscle power by the vertical jump test shows that out of 42 individuals tested: 16 subjects or 38.09% belong to the low category, 8

participants or 19.04% belong to the middle class while 11 subjects or only 26.19% made in the ideal category while seven or 16.66% subject belonged to the high level. On the six prototypes of sports branches that we took at random to evaluate the muscular speed and the muscular power of the lower limbs, we can see that the nature of the game is a function of the improvement of the muscular quality. This is observed in the discipline of Volleyball which allows players to acquire good muscle quality and very good muscle power which allows a good reaction to any performance.

Cycling

Athletes in the Yogyakarta area who cycle, the results have shown that the intensity used during training is not effective, not only on the intensity side but on the other hand the training load does not meet the need for athlete what makes that during the competitions one receives can of athlete who come in the region of Yogyakarta which gains the victory. It is a question of reviewing the training that these athletes do to discount a good score. Coaches must absolutely do investigation to bring a menu that will benefit their athlete. The evaluation tests like the pre-test and posttest are much more encouraged to know the weakest and strongest points of the athlete

Volleyball

Volleyball is a sport that helps transform your body. With Volleyball, the player refines his silhouette, gains muscle and tone, his thighs and his abdominals are strengthened to the acceleration phases. Indeed, the benefits of volleyball on the physical and mental are undeniable. On the one hand, it allows you to: Stimulate your cardiovascular and respiratory capacities as well as your endurance. Improve speed, agility and reflexes. The nature of the game of volleyball favors an athlete of any discipline to kindly develop speed and muscle power as a result of his multidirectional reactions.

Climbing

The results found on climbing have shown that athletes in the Yogyakarta area maintain a very low level on the speed of movement. This is the effect of a very weak muscular power. Normally A climbing athlete must be equipped with a very high speed of execution and a muscular power to gang up the competition but also to protect against musculoskeletal accidents.

Pencak Silat Indonesian Martial Art

Like volleyball, the results of the Pencak silat showed an approximate value in terms of muscle speed and muscle power. Pencak silat, a very recognized discipline of Indonesian origin, is much more favorable for improving the physical qualities of an athlete. The trainings of this discipline are complete and therefore they favor very well the enormous development of the speed and the muscular power of the lower limbs.

Female Rugby

Knowing that the speed and the muscular power of the lower limbs of the limbs are among the most important qualities that a rugby player must have, the results of research have proved that for women's rugby in Indonesia his level still remains in need of be improved to reach the minima. You cannot hope to defeat a rugby match or championship if the physical conditions are still weak since rugby requires full body. Rugby players need to have different levels of strength, power, endurance, speed and agility. ... For example, a player must develop a good general base in terms of strength, stability, mobility and resistance on which he will rely to increase his qualities of speed and power.

Judo

The results obtained have proved that coaches do not follow up to direct their athletes in a good way since judo is a sport discipline which requires several physical components: endurance, strength, speed, flexibility, of weight... It is necessary to observe the athlete well before making him do intense exercises which can reduce his performance. The level of physical qualities of judokas is still low

		Paired Differences					t	df	Sig. (2- tailed)
		Mean	Std. Deviation	Std. Mean	95% CI diff				
					Lower	Upper			
Pair 1	Cycling Volleyball	-21.2	12.632	4.774	-32.968	-9.602	-4.458	6	0.004
Pair 2	Cycling - Climbing	0.4	12.340	4.664	-11.841	10.984	-0.092	6	0.930
Pair 3	Cycling - Pencak	-6.0	14.866	5.618	-19.748	7.748	-1.068	6	0.327
Pair 4	Cycling - Rugby	5.5	10.517	3.975	-4.155	15.298	1.402	6	0.211
Pair 5	Cycling - Judo	4.5	20.517	7.754	-14.403	23.546	0.590	6	0.577
Pair 6	Volleyball Climbing	-20.8	13.631	5.152	8.250	33.463	4.048	6	0.007
Pair 7	Volleyball Pencak	-15.2	7.064	2.670	8.752	21.819	5.725	6	0.001
Pair 8	Volleyball - Rugby	26.8	10.023	3.788	17.586	36.127	7.089	6	0.000
Pair 9	Volleyball - Judo	25.8	11.141	4.211	15.552	36.161	6.140	6	0.001
Pair 10	Climbing - Pencak	-5.5	12.286	4.643	-16.934	5.791	-1.200	6	0.275
Pair 11	Climbing - Rugby	6.0	14.433	5.455	-7.349	19.349	1.100	6	0.314
Pair 12	Climbing - Judo	5.0	19.723	7.454	-13.240	23.240	0.671	6	0.527
Pair 13	Pencak - Rugby	11.5	12.594	4.760	-0.076	23.219	2.431	6	0.051
Pair 14	Pencak - Judo	10.5	11.399	4.308	0.028	21.114	2.454	6	0.050
Pair 15	Rugby - Judo	1.00	18.348	6.935	-17.969	15.969	-0.144	6	0.890

Table 3. comparison of the Vertical Jump data of the different Sporting disciplines by Paired Samples Test

The deep analysis of this table has advised that the coaching accomplished at volleyball seems beautiful and very helpful on the low limbs power of athletes, the nature of a sport is a feature of performance. The outcomes exhibit an extensive difference in vertical jump in volleyball athletes compared to others. In short, volleyball a discipline of Indonesian origin can be used to enhance the bodily capacities of different sports disciplines

DISCUSSION

The results obtained in this research have proved that except volleyball and pencak silat which can improve in a positive way the speed and the muscular power of athletes for the other disciplines, it has been noted that the training done does not allow athletes to acquire good physical qualities. Nevertheless many factors are required to success in sport like speed, muscular power, strength, agility, and cardio vascular muscular (Taye & Wondirad: 2017; Marszałek et al.: 2018, pp.367–379). Pencak silat it is a martial art which helped athletes to develop the whole body and the physical fitness of athletes (Prasetyo & Siswantoyo: 2019, pp.409–411). Vertical jump which was carried out very close to a graduated wall undoubtedly makes it possible to calculate the muscular power of the lower limbs, but that is the object of evaluation of the training done by the athlete. according to the results it was noted that for judo, climbing, cycle and rugby the levels are still low and require training focused on the physical qualities which the athlete needs to achieve his performance among other strength, power, muscle speed, cardio-vascular endurance and others

In a recent study, a team of Swiss researchers tested reliability and reproducibility of jump performance using an accelerometer (Myotest SA) attached to a belt during a squat jump. This value of reproducibility depends on both the reproducibility of the tool as well as that of the athlete to reproduce the same performance. By validity is meant the ability of the tool to produce a measurement close to the true value (standard value or value obtained from another tool considered as reference) (Ronconi et al.: 2016, pp.1–5; Shaari et al.: 2019, pp.174–187). Sport is an extremely heterogeneous set of disciplines and ways of practicing them. Sports activities do not only concern direct practitioners, whether they are more or less professional high-level athletes, regular participants in competitions, or sports enthusiasts (Vishaw Gaurav et al.: 2015, pp.39–45; Iswana & Siswantoyo: 2013, pp.26–36). It is directly involved in such a multiplicity of actors that it is impossible to make an exhaustive enumeration of them: coaches, doctors, paramedical staff, club managers, organizers of competitions, agents of ministries in charge of sports, staff of federations, sports leaders, vendors of equipment, equipment managers, specialized journalists, volunteers contributing to the smooth running of events

The evaluation of the sportsman can be envisaged according to two aspects: (1) the medico-sportsman and (2) the optimization of the sports performance. While the first considers the medical history of the subject and seeks to determine its suitability compared to standards from a health perspective, the second seeks to guide the athlete in his preparation towards a specific objective. and develop performance support strategies (Bonnier & Marique: 2009). To assess the physical fitness of Yogyakarta athlete, aim to determine the current level of the low limbs.

CONCLUSION

To become a top athlete, to participate in sporting events, in championships, to achieve sports performances, to become a world champion, you must have qualities, including the following: physical fitness like strength, muscle speed, muscle power, cardiovascular endurance, agility, the ability to resist fatigue. We cannot hope to discount a good performance if we did not test the assessment of physical fitness of the athletes. The result above showed that some training giving to the athletes are not specific the reason why some physical qualities of the athletes are in a low category.

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