

ALTERNATIVE WAYS OF ASSESSING EXPLOSIVE STRENGTH OF LOWER LIMBS

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Original scientific paper

Abstract

Strength, usually called dynamic force, is associated and strongly connected not only with sport but also with physical reaction and physical education. The aim of the undertaken studies was an attempt to solve the problem of finding a proper test of diagnosing strength, Sargent's vertical jump or a long jump. The research was carried out among 121 of schoolgirls and 128 schoolboys of the junior high school. The participants of the tests were asked to make the attempt of the vertical jump as well as the long jump twice. The obtained data were analyzed by comparing the results of the mentioned tests with the help of the Pearson's indicator. The review of the field tests with reference to both tests was also made. Research tools of the Polish and foreign authors were analyzed with regard to the strength diagnosis. Taking into account the Pearson's modulus of correlation, it can be claimed that both tests can be used interchangeably. Analysis of the fitness tests used in Poland, Europe and in the whole world shows that in almost every research tool elaborated for the needs of accessing motor abilities, the test of strength can be found, although it does not always have to be a vertical jump or a long jump trial.

Key words: strength, trial, vertical jump, long jump, norms.

INTRODUCTION

All human movements contain to some extent the components of strength, speed, coordination, time dimension of performance, complexity and range of physiological motion. You can, therefore, differentiate their specific functional and motor aspects such as strength, speed, endurance and coordination (Bompa 1989).

Strength is a forcing disposition (dynamic power), being an optimal combination of strength and speed for creating a body move. Throws and jumps in athletics, most of gymnastics elements, diving, fencing and many other disciplines requiring bouncing, high jump, stroke or overarm are main recipients of the benefits coming from developing anaerobic strength non-lactic acidic (Bompa 1989).

Each person leading a sport activity, however, should monitor the efficiency of motor ability of the exercised taking into consideration one of the links of the praxeological chain, which is the diagnosis. To assess the maximum, non-lactic acidic anaerobic power, very popular indirect tests such as a standing jump and vertical jump as well as more time-consuming and complicated direct tests (laboratory) can be used.

The work compares two tests: a standing jump and a vertical one, as measures of maximum non-lactic acidic anaerobic power. The results

obtained in both tests by the examined, specifically their level did not have in this case, the importance of assessing the status of the team state of preparation. The aim of the research was an attempt to clarify whether the tools of research, which differ in the direction of the bouncing, give comparable information about the level of this motor capacity, as well as which of them you may need to use for 13 – year-olds taking into account the results obtained by the tested and making a review of the field tests in the light of these trials.

METHODS

Studies have been carried out in December 2009 in Junior High School No 22 in Radom. There were 121 girls and 128 boys at the age of 13 participating. Vertical jump was carried out at the gym where students sideways to the wall were performing a squat swinging with an arm and next, a jump with a touch at the highest possible point at the board. An attempt was performed twice with a 5 minutes break. A better result was taken into account, which was the distance in centimeters between the trace left after the jump and the trace left in the standing position.

An attempt in the standing jump was also carried out in the gym. The students with the knees bent doing a swing of the arms performed a jump with a move of arms forward. An

attempt was done twice with a 5 minutes break. A better result measured in centimeters was taken into consideration. It was a distance from the line of the jump to the back of the heel after the jump. To compare the results of both tests, the Pearson's modulus of correlation was used.

arithmetical mean (\bar{x}), standard deviation (SD), minimum (min) and maximum (max) was counted. The strength of the relation between a standing jump and a vertical jump was determined on the basis of the Pearson's modulus of correlation.

The analysis was carried out with the use of basic statistical measures. Median (med),

STATISTIC ANALYSIS AND THE RESULTS

Table 1. Statistical characteristics of the tested girls and boys.

Explosive strength in the jumps	Med	\bar{x}	SD	Min	Max	rs
Vertical jump [girls]	157	156	14,62	120	189	0,425
Standing jump [girls]	32	32,2	4,48	23	46	
Vertical jump [boys]	190	186,1	19,37	140	215	0,735
Standing jump [boys]	35	35,7	6,29	23	47	

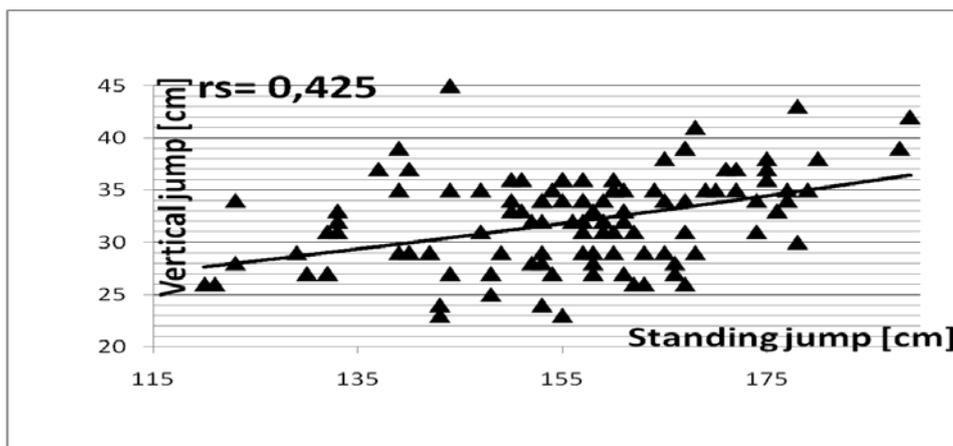


Figure 1. Relationship between the long jump and a vertical jump of the first grade girls of the junior high school.

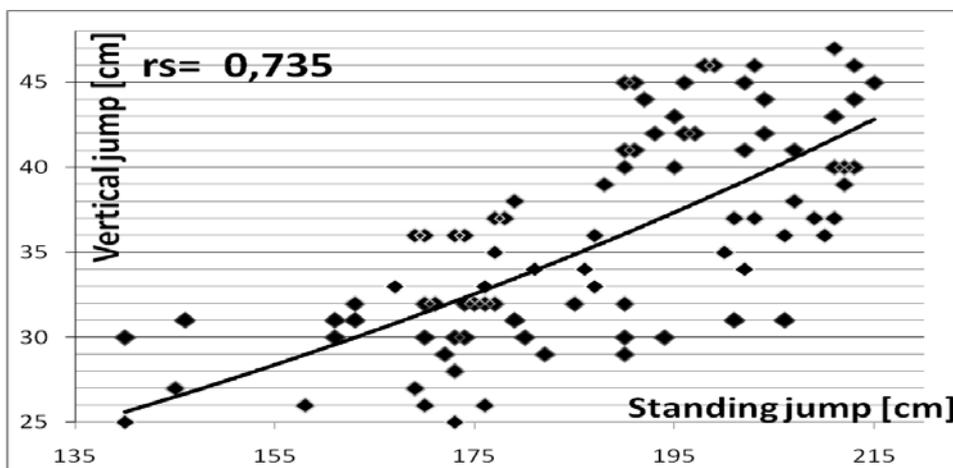


Figure 2. Relationship between the long jump and a vertical jump of the first grade boys of the junior high school.

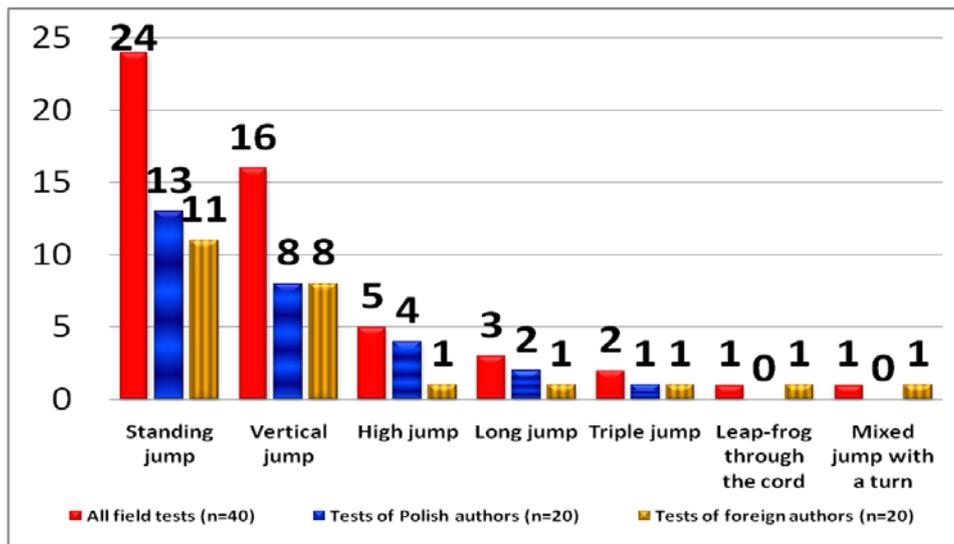


Figure 3. The frequency of occurrence of individual tests that measure the explosive strength in 40 tests of Polish and foreign authors (Makuch 2008).

DISCUSSION

Despite the fact that both tests vary in the direction of the bouncing as well as the way of carrying it out, in the case of girls a correlation coefficient (0,425) has been achieved, as far as the boys are concerned, the level is quite high (0,735). Relationship is presented by graphs 1 and 2. Lower rate among girls is connected with their lower move activity, because none of the tested girls attended recreational or sports activities. Among the surveyed boys, most of them were football players in a sports club MSPN "Radomiak 1910".

The average score for boys in the long jump was 181,1 cm, and in a vertical jump 35,7 cm and similarly for girls 156,0 cm and 32,2 cm. The real champion among boys obtained 215 cm in the long jump and 47 cm in the vertical jump, and the weakest of the tested – 140 cm and 23cm. Among girls, the best result is 189 cm and 46 cm and 120 cm and the weakest 120 cm and 23 cm.

The authors of these tests are not unanimous and some propose one attempt to assess the power – a standing jump, while others propose performing a vertical jump. However, the creators of Physical Efficiency Test for adults require realization of both trials. Test of the Minimum Physical Efficiency of Kraus Weber received by many specialists as a measure of health, does not provide for any attempt to assess strength, therefore, it is concluded that as

the motor ability, the power is of secondary importance for health.

In the carried survey of tests, explosive strength is assessed on the basis of the standing jump, a vertical jump, a long jump, a high jump, a triple jump, a leap-frog through the cord and a mixed jump with a turn. By far the most common is the use of two trials, i.e. the standing jump and a vertical one. Other tests are much less popular among creators of tests (figure 3).

PRACTICAL ASPECTS

1. Taking into account obtained correlation coefficient can be deduced that both tools may be used interchangeably as an attempt to assess the strength, because in the case of boys a high correlation coefficient (0,735) has been achieved, while the correlation coefficient among girls is at the moderate level (0,425).
2. In almost any research tool developed for the purpose of assessing the motor abilities the trials of testing power appear, but this is not always a vertical jump or a standing jump.
3. Much more often the standing jump occurs and it is present in the research tools such as the European Fitness Test and the International Fitness Test, which are most commonly used in scientific research.
4. The standing jump is the easiest research tool in population tests.

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ALTERNATIVNI NAČINI TESTIRANJA EKSPLOZIVNE SNAGE DONJIH EKSTREMITETA

Originalni naučni rad

Sažetak

Snaga, obično nazivana dinamička sila, je u vezi i usko povezana ne samo sa sportom, nego i sa tjelesnom rekreacijom i tjelesnim odgojem. Cilj ovog istraživanja je bio pokušaj da se riješi problem pronalaska primjerenih testova za dijagnostiku snage, Sargentovog vertikalnog skoka i skoka u dalj. Istraživanje je provedeno na 121 učeniku i 128 učenica srednjih škola. Ispitanici su zamoljeni da naprave vertikalni skok, kao i da dva puta skoče u dalj. Dobljeni rezultati su analizirani poredeći rezultate pomenutih testova uz pomoć Pearsonovog pokazatelja. Pregled terenskih testova sa osvrtom na oba testa je također urađen. Istraživački alati poljskih i stranih autora su analizirani što se tiče dijagnostike snage. Uzimajući u obzir Pearsonove modele korelacije, može se tvrditi da oba testa mogu biti korištena naizmjenično. Analiza fitnes testova korištenih u Poljskoj, Evropi i cijelom svijetu pokazuje da skoro svaki istraživački alat elaborira potrebu testiranja motoričkih sposobnosti, neki test snage može biti pronađen, mada ne mora uvijek da bude vertikalni skok ili skok u dalj.

***Ključne riječi:** snaga, pokušaj, vertikalni skok, skok u dalj, norme.*

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Received: 29 April 2012

Accepted: 01 June 2012