115 - TEST OF ANAEROBIC POTENCY MICROCONTROLLED FOR PLAYERS OF VOLLEYBALL: A PROPOSAL OF VALIDATION

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1 - INTRODUCTION

The potency is a term used to describe amount of work per unit of time (GARRET AND KIRKENDAL, 2003. In other words, an athlete that can accomplish certain amount of work in a less possible time has a great capacity generating muscular potency. That is important for the evaluation of the athletes' performance, because it reveals powers and limitations and, in many sports, the potency is the base for the development of training programs

For the athletes' functional evaluation, several tests are used in the attempt to determining the potency and the anaerobic capacity such as: Test of Vertical Jump, Test of Margaria-Kalemen, Maximal Anaerobic Running Test, Test of Quebec 10s or 90s, Test Wingate, Test of Bosco, Test of Throwing of the Medicine Ball (KISS, 2003; MATSUDO, 2005; STOCKBRUGGER and HAENNEL, 2001; BOSCO, 1996). All those tests demonstrated a good validity and have been constantly used to evaluate the athletic abilities or the effects of the training program, even if most does not assist the principle of the specificity.

The technological researches applied to sports and its benefits for the control of the training process have brought great progresses. Bosco (1996) says that the coming of instruments that allow a dynamic action has generated a notable progress in the diagnostic evaluation, providing very useful information on the characteristics of the muscular activity during the sport activity. New tests and equipments, considering the principle of the specificity in sports are created and constantly validated to evaluate the performance and the athlete's performance.

2 - PROPOSITION

The present study has as objective to validate a test of anaerobic potency, respecting the specificities of the displacements and actions of the volleyball.

3 - SAMPLE

The sample consisted of 7 male volleyball payers, who where 18 ± 0 years of age, 1,86 ± 0,07 cm of stature, 68,5 ± 0,71 of body mass and 12,55 ± 1,84 of percentile of fat, of the teen category Paraiba's main team.

4 - PROCEDURES FOR COLLECT OF DATA

The coach of the team who was in charge was contacted to explain all of the procedures to be applied. Also, filling in form was handed in to ethics committee and the Term of Free and Illustrious Consent so that they were signed.

The tests were applied in a adapted space in the bottom of the volleyball square where the team training happened, denominated of "LABTV" (Laboratory for Test of Volleyball), simulating the atmosphere of the volleyball square, according to the illustration 1 and 1a.



Illustration 1: LABTV

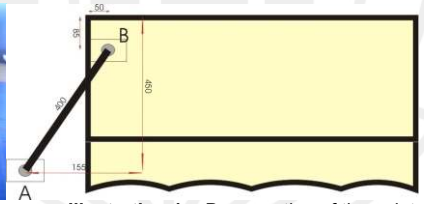


Illustration 1a: Demarcation of the points of jumps and of passage of the course of VTP

The collection of the data was divided in two stages. In the first, the RAST was applied (adapted for 30 meters). The athletes were guided about the protocol of the test: 10 minutes of warming up and 5 of rest, before the accomplishment of the test. The course was monitored by 3 pars of photocells fastened in tripods and interconnected to the computer. The test was accomplished individually, after the warm up (10 minutes) and rest (5 minutes). To begin, the athlete was positioned with the impulse foot the closest to the line of exit of the exit of the course. After the configuration of the equipment, the sign was given to begin. For the control of the time two appraisers were put in the two extremities of the course with the function of timing the rest interval that lasted (10 seconds) between the shots and to inform the athletes that time, aloud. This procedure was followed with the other athletes. After the end of that stage, the athletes were guided on the date and the place of the next stage (exactly one week later).

During the second stage, the applied test was VTP. It was proceeded with the demarcation of the points of passage of the test and respective course in the square, observed in the illustration 1a following the adapted protocol of Sousa and Pellegrinotti (2005)

For the installation of the Hardware, it was followed the protocol of Sousa and Pelegrinotti (2005), which it can understood: positioning of the sensor of floor (close of the net and of the line of the three meters), it was obtained the connection of the equipment through cables and connectors tends soon afterwards, adjusted the azimuth of the sensor ones.

5 - DESCRIPTION AND DEVELOPMENT OF VTP

It was composed of the movements in the following sequence: displacement forward in diagonal, vertical jump simulating an attack (cut), running backwards in the diagonal towards the starting point. Before the beginning of the test, the athlete went by the course, in a slow way, just simulating the technical gestures to familiarize with the protocol, being the ready equipment, just awaiting the appraiser's sign to begin the test.

During the accomplishment of the test, the individual's path was made on the demarcation ribbon fastened in the soil, having been put cones behind the point "A" and after the point "B", with the function of to limit and to address the athlete's displacement, as well as to avoid that the athlete crossed the areas of passage and jump. The individual accomplished the jumps with the united feet, in the jump area and of located passage in the point "B", so much in the impulse phase, as in the fall, executing the technical gesture of the cut.

To start the test, after emission of resonant sign (bip), the athlete left the point "A", running the distance of 4 meters to the

point "B", accomplishing at that place the attack gestures and as soon as she played the feet in the soil, immediately, she moved again until the point "A", repeating that action 3 times, completing the first cycle of VTP. The distance traveled in the end of a cycle was of 24 meters following by an interval of rest of 8 seconds, concluded by the resonant sign emitted by the computer. After the repetition of each cycle, there was a continuous bips emission, signaling for the end of the rest and, after 5 seconds, the restart of a new cycle. After each cycle, the athlete stayed in the position at the beginning of the test (point A), waiting for the sound of a lingering and only bip, beginning new repetition, until completing six times that same action. Totaling, like this, the traveled final distance of 144 meters.

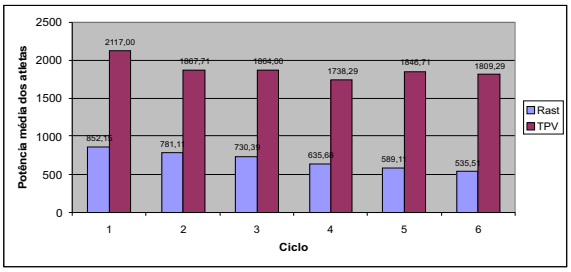
6 - ANALYTIC PLAN

The appraised athletes' data for RAST and VTP were organized in a database with the use of the Excel electronic spreadsheet and the Statistical Package goes Social the Sciences (SPSS) 8.0 Windows version.

In the plan of analysis of the data, descriptive statistics was used: average, standard deviation, maximum and minimum value, Alpha of Crombach, variation coefficient

7 - RESULTS

The medium potency of a sample of seven appraised athletes in RAST and VTP in six cycles is shown in the graph 1.



Graph 1: Medium potency for each cycle in a study with 7 volleyball athletes.

In agreement with the graph 1, there are differences among the medium value of the medium potency observed in the 7 athletes. A reasonable explanation for that fact is that the distance in the courses of the two tests are 24 and 30 meters, respectively. Analyzing VTP, it could observe that the action of the attack is constituted of a combination of movements that includes a race to take the performer to the place of the executed jump in a horizontal speed transformed in pulse with vertical predominance, of jump and simulation of the cut, actions that might have made an increase in the potency.

RAST, where the course is lineal of 30 meters with constant acceleration and slowing down after the arrival line also constant, not requesting specific gestures of the volleyball, it might have made a value of smaller potency. Therefore, being the distance of smaller VTP than the one of RAST, promotes a higher medium potency.

For evaluation of the inner consistence of the taken measures for the athletes in the tests RAST and VTP, the measure of trustworthy Alpha of Crombach was used. Table 1 presents the measure alpha of Crombach for the deleted item (trustworthy measure if each cycle were omitted). That is: each cycle, while taken out for the calculus of the trustworthy measure allows it is importance to be determined according to the strong difference that comes to exist in relation to the trustworthy measure with all of the cycles.

TABLE 1: Measure alpha of Crombach for the deleted item and descriptive statistical measures, average, standard deviation and variation Coefficient for the potency

Cycle	Deleted Item		Average		Standard Deviation		CV	
	RAST	VTP	RAST	VTP	RAST	VTP	RAST	VTP
1	0,9424	0,9004	852,15	2117,00	160,74	854,38	18,86	40,36
2	0,9127	0,9131	781,11	1867,71	113,50	423,24	14,53	22,66
3	0,9101	0,9101	730,39	1864,00	125,57	446,82	17,19	23,97
4	0,9096	0,8816	635,68	1738,29	106,88	819,73	16,81	47,16
5	0,9419	0,8941	589,11	1846,71	99,77	756,56	16,94	40,97
6	0,9374	0,9155	535,51	1809,29	114,82	759,73	21,44	41,99
All	0,9382	0,9183	687,33	1873,83	147,45	655,52	21,45	34,98

It was observed in the Table 1 that, in each cycle, the measure alpha of Crombach is close to 0,9382 for the test RAST and of 0,9155. Those values are considered very well (PEDHAZUR and SCHEMELKIN, 1991). The only cycle 4 is it that more strays of the values (0,9382, 0,9155) = (RAST, VTP). Therefore, among all of the cycles, it is probable that the athletes have assimilated the course better, after the first three cycles, automating the movements of the test, characterizing, like this, an increase in the potency during the accomplishment of that cycle. It was demonstrated, like this, that it is necessary a good technical level as well as a total assimilation of the course, due to the peculiarities of VTP (abrupt stops, jumps, displacements back). The athletes their instrumental answers developed, improving them during the execution of the cycles, provoking in that way, oscillations in the measure of the trustworthy. It observes that, for that reason, the coefficient of variation of the test VTP has superior values to the coefficient of variation of the test RAST. The same happens with the standard deviation of each cycle. Be observed, also, in the Table 1, that the average of each cycle of VTP is superior measured her/it of RAST and, for all of the cycles, the average VTP is approximately four times larger than the average of the cycles of the test RAST.

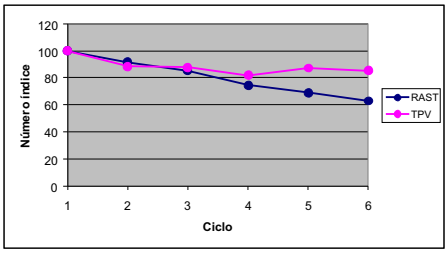
The Table 2 presents the variations of the appraised medium potency in the seven athletes of this study, through the number index with base fastens in the first cycle.

TABLE 2: Average and Number index of the potency for cycle

Cycle	Average		Number index	
	RAST	VTP	RAST	VTP
1	852,15	2117,00	100,0	100,0
2	781,11	1867,71	91,7	88,2
3	730,39	1864,00	85,7	88,0
4	635,68	1738,29	74,6	82,1
5	589,11	1846,71	69,1	87,2
6	535,51	1809,29	62,8	85,5
All	687,33	1873,83	80,7	88,5

It is observed, in the Table 2, that the averages of the athletes' potency for cycle of RAST are decreasing, while the averages of the test VTP are decreasing until the fourth cycle and, starting from the fifth cycle, they continue decreasing. That fact can be observed with the values of the averages by cycle and of the index numbers. For better perception, the graph 2 display the

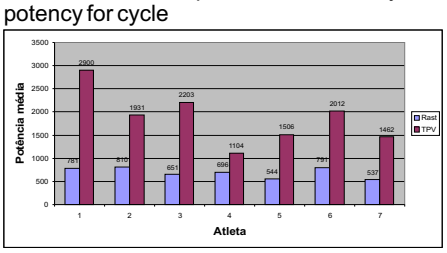
evolution of the athletes' medium potency through the index numbers with base fastens in the first cycle.



Graph 2: Number index of the athletes' potency for tests RAST and VTP.

It can be observed, in the graph 2, that, in finish cycle, the test RAST presents the medium potency approximately of 40% below his/her medium potency of the first cycle and the test VTP presents a fall of only 20% of the potency of the first cycle.

The graph 3 display the medium potency for cycle



Graph 3: Medium potency for cycle for the tests RAST and VTP.

It is observed in the graph 3 that the athlete of better performance in the test VTP was the athlete 1 and in the test RAST the athlete 2. also, other fact that in the fire the attention and it proves the behavior in each athlete's income, it is that, in the two tests there is a growing and decreasing quantitative variation, evidencing with that analyzes the accuracies that the instrument evaluated the attribute for which he was projected. In that sense (TRISCHLER, 2003), he/she gives us a margin of safety and credibility when he/she affirmed that the validity concept refers the "adaptation, significance and usefulness of the specific inference done starting from the results of the test.

8 - DISCUSSION

In that study we obtained the measures in the closest possible conditions of the pattern of movement of the ability, being taken into account the principle of the specificity. Thus, one of the primary questions was to determine a way to quantify, by means of a work test of the potency carried out by the volleyball athlete,

In the perspective of elaboration of tests to measure the capacity of the individual's performance, it is considered important the work of Sousa and Pellegrinotti (2005) that studied the validity of the electronic equipment in a battery of tests of technical movements in the volleyball, in the attack zone (displacement of speed, cut, blockades and the total traveling distance in the race).

In the previous literature there were not estimative registrations of the test validity of specific potency for the volleyball, that shows the potency pick (PP), medium potency (MP), potency minimum (PM) and the index of fatigue (IF). Therefore, one of the problems of evaluation of the volleyball payer's performance is attached to the elaboration of systems of tests and validated and reliable measures that express aspects of the athletes' performance.

Considering the objective of this work, we took as base the comparative study of the results between the VTP and RAST test adapted that presented medium values and standard deviations of the found results in the administration of VTP and RAST (adapt.) for the potency pick (PP), medium potency (MP). The medium values of the pick of potency taken for VTP were 2400,9±719,3W, while for the RAST(adapt.): 852,9±166,0 W. The medium values of the medium potency (MP) was estimated in the VTP 1874±588,8W, while for RAST (adapt.): 687,3±114,8W.

Those differences that are presented in the indexes of the potency cycles consider that to the carried out actions and to the standard involvement of movement. In the two tests, that happened due to the fact the RAST was lineal and the athlete developed constant acceleration, during the accomplishment of the whole course. In VTP, that acceleration is intermittent, because the course does not allow such actions, because, it has only 4 meters of length, where the athlete develops his maximum speed in the gesture of attack, in other words, three steps forward followed by a vertical jump, imitating the attack and afterwards the fall, return, running backwards to the initial point.

In short, in the different comparisons between reported VTP and RAST (adapt.) tests it was verified that some important facts among the indicators of anaerobic potency of the RAST and VTP: a) VTP presented higher medium values in the amount of work, that in an effort of 60 seconds in relation to RAST; b) In RAST, the index of fatigue (IF) was inferior to VTP, indicating that they are different; c) In the observation of estimated PP, the intermittent and continuous tests presented close medium values and, because of that it could point out an advantage measurement of PP.

9 - CONCLUSIONS

In this study we observed that VTP measured the capacity of performance of the potency and that it was technically necessary to register that capacity carried out by the athlete.

We verified to have contributed with new methodologies for the volleyball in relation to the potency, because the validation was made taken into account measurement in the closest possible conditions of the pattern of movement in this sport.

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TEST OF ANAEROBIC POTENCY MICROCONTROLLED FOR PLAYERS OF VOLLEYBALL: A PROPOSAL OF VALIDATION

ABSTRACT

The specificity of the sport gesture is a constant concern during the planning of the training sessions, in all sports, and it is based in that new tendency that in this work has the objective of validating a test of anaerobic potency, respected the specificities of the displacements and actions of the volleyball. 7 male volleyball players took part in the study, who where 18 ± 0 years of age, 1,86 ± 0,07 cm of stature, 68,5 ± 0,71 of body mass and 12,55 ± 1,84 of percentile of fat, from the teen category of the Paraiba's main team. For the collect of data, it was used the adapted protocol of Sousa and Pellegrinotte (2005) and RAST (Running-based Anaerobic Test). The used variables were: speed (m/s), height (cm) of the vertical jump (coach gesture of the attack), running total distance, changes of direction, and number of vertical jumps. In the plan of analysis of the data, the descriptive statistics was used: average, standard deviation, maximum and minimum value, Alpha of Crombach, variation coefficient. The averages of the maximum and medium potency, for VTP and RAST, were, respectively of 2400,9±719,3W and 852,9±166,0W; 1874±588,8W and 687,3±114,8W. In this study it was concluded that VTP measured the capacity of performance of the potency and it was technically needed to register the athletes' performance. **Word-key:** Tests, volleyball, potency.

EPREUVE DE PUISSANCE ANAEROBIE MICROCONTROLE POUR JOUEURS DE VOLLEY-BALL: UNE PROPOSITION DE VALIDATION

RÉSUMÉ

La spécificité du geste du sport est une inquiétude constante pendant l'organisation des sessions de la formation, dans tous les sports, et il est basé dans cette nouvelle tendance que dans ce travail a l'objectif de valider une épreuve de puissance anaérobie, a respecté les spécificités des déplacements et actions du volley-ball. 7 joueurs du volley-ball virils ont participé à l'étude qui où 18 ± 0 années d'âge, 1,86 ± 0,07 centimètre de taille, 68,5 ± 0,71 de masse du corps et 12,55 ± 1,84 de centile de graisse, de la catégorie adolescente de l'équipe du principal du Paraiba. Pour le rassemblez de données, il a été utilisé le protocole adapté de Sousa et Pellegrinotte (2005) et RAST (Effectuer l'Épreuve Anaérobie Basée). Les variables usagées étaient: vitesse (m/s), hauteur (centimètre) du saut vertical (geste de l'entraîneur de l'attaque), distance du cumul, changements de direction, et nombre de sauts verticaux. Dans le plan d'analyse des données, le statistique descriptif a été utilisé: faites la moyenne, déviation standard, maximum et valeur minimum, Alpha de Crombach, coefficient de la variation. Les moyennes de la puissance maximale et moyenne, pour VTP et RAST, étaient, respectivement de 2400,9±719,3W et 852,9±166,0W; 1874±588,8W et 687,3±114,8W. Dans cette étude il a été conclu que VTP a mesuré la capacité de performance de la puissance et il a été eu besoin techniquement d'enregistrer la performance des athlètes.

Mot clef: Épreuves, volley-ball, puissance.

A PRUEBA DE POTENCIA ANAEROBIO MICROCONTROLADO PARA JUGADORES DE VOLEIBOL: UNA PROPUESTA DE APROBACIÓN

RESUMEN

La especificidad del gesto deportivo es una preocupación constante durante la planificación de las sesiones de entrenamiento, en todos los deportes, y es basado en esa nueva tendencia que en este trabajo tiene el objetivo de validar una prueba de potencia anaerobio, respetó las especificidades de los desplazamientos y acciones del voleibol. 7 jugadores del voleibol masculinos tomaron la parte en el estudio que donde 18 ± 0 años de edad, 1,86 ± 0,07 centímetro de estatura, 68,5 ± 0,71 de masa del cuerpo y 12,55 ± 1,84 de percentil de grasa, de la categoría adolescente del equipo principal del Paraiba. Para el coleccione de datos, se usó el protocolo adaptado de Sousa y Pellegrinotte (2005) y RAST (la Prueba Anaerobio Funcionamiento-basado). Las variables usadas eran: la velocidad (el m/s), altura (el centímetro) del salto vertical (el gesto del coche del ataque), distancia del total corriente, los cambios de dirección, y número de saltos verticales. En el plan de análisis de los datos, la estadística descriptiva se usó: promedie, desviación normal, el máximo y valor mínimo, el Alfa de Crombach, el coeficiente de la variación. Los promedios de la potencia máxima y elemento, para VTP y RAST, eran, respectivamente de 2400,9±719,3W y 852,9±166,0W; 1874±588,8W y 687,3±114,8W. En este estudio se concluyó que VTP midió la capacidad de actuación de la potencia y se necesitaba registrar la actuación de los atletas técnicamente.

Palabra-importante: Pruebas, Voleibol, Potencia

TESTE DE POTÊNCIA ANAEROBIA MICROCONTROLADO PARA JOGADORES DE VOLEIBOL: UMA PROPOSTA DE VALIDAÇÃO

RESUMO

A especificidade do gesto desportivo é uma preocupação constante durante o planejamento das sessões de treino, em todos os esportes, e é embasado nessa nova tendência que, neste trabalho objetiva-se validar um teste de potência anaeróbia, respeitando-se as especificidades dos deslocamentos e ações do voleibol. Participaram do estudo 7 voleibolistas do sexo masculino, com 18 ± 0 anos de idade, 1,86 ± 0,07 cm de estatura, 68,5 ± 0,71 de massa corporal e 12,55 ± 1,84 de percentual de gordura, da categoria juvenil da Seleção Paraibana. Para a coleta de dados, foi utilizado o protocolo adaptado de Sousa e Pellegrinotte (2005) e o *RAST* (*Running-based Anaerobic Test)*. As variáveis utilizadas foram: velocidade (m/s), altura (cm) do salto vertical (gesto técnico do ataque), distância total percorrida, mudanças de direção, número de saltos verticais. No plano de análise dos dados, utilizou-se a estatística descritiva: média, desvio padrão, valor máximo e mínimo, *Alpha de Crombach,* coeficiente de variação. As médias da potência máxima e média, para o TPV e RAST, foram, respectivamente de 2400,9±719,3W e 852,9±166,0W; 1874±588,8W e 687,3±114,8W. Concluiu-se, neste estudo, que o TPV mensurou a capacidade de rendimento da potência e foi tecnicamente preciso ao registrar desempenho dos atletas.

Palavras-Chave: Testes, voleibol, potência.