

69 - VERIFICATION OF PHYSICAL CAPACITIES CORRELATIONS IN GIRL VOLLEYBALL PRACTITIONERS.

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INTRODUCTION

Volleyball is constantly evolving, becoming increasingly popular and competitive. According to Silva et al (2003), it is believed that the achievements made by the Brazilian teams, both male and female, in all categories in recent years may have contributed to the increasing popularity of the sport and the participation of children and adolescents at clubs and sports schools.

The energy the body consumes in Volleyball derives mainly from the anaerobic route, more precisely, anaerobic alactic during the active periods (SMITH et al, 1992). However, the extended length of a Volleyball match, where players are constantly and rapidly moving in different directions, jumping, blocking and serving, with low levels of lactate in the blood, indicates that both the aerobic route (NUNES et al, 2000), and the neuromuscular system are also important for volleyball players (GADEKEN, 1999).

The increasingly intense participation of adolescents in specialized training, aiming to achieve higher performance and better results in competitions, has increased concerns of professionals involved in sports science, mostly related to the proper physical education these youngsters are receiving, since at this age conditions are most favorable for the development of all physical abilities, through a rational, pedagogical and systematic action (MARQUES et al., 2002; NETO et al., 2006).

Therefore, standardization for capabilities development for different sports modalities at different ages becomes necessary. According to Bohme (2000) and other authors, the determination of specific profiles for different sports modalities would assist during the initial training of young athletes.

The vertical jump, along with the AnP and the VO₂-max are among the main physical capacities required for volleyball (PLATONOV et al., 2003). Bompa (2002) highlights that these variables, when worked and analyzed separately, do not reliably reflect an athlete's ability to perform physical work. On the other hand, the correlation between these variables enables a more consistent analysis of the athlete's physical talent.

Since the literature lacks reference values for adolescents undergoing systematic sports practice, particularly in Volleyball, this study aims to evaluate and correlate jump capacity, AnP and VO₂-max of adolescents undergoing sports initiation in Volleyball.

METHODOLOGY

This study has been approved by the Research and Ethics Committee of the Universidade do Vale do Paraíba (UNIVAP), registered as H08/CEP/2010, according to the resolution 196/96 of the National Health Council. All tests have been conducted at the track and field premises at UNIVAP Vila Branca campus, Jacarei, SP.

The test sample was composed by 25 girls at ages ranging from 12 to 14 years. Both the parents and the coach signed a consenting form regarding the participation of the girls.

MATERIAL

For the AnP and aerobic resistance tests, we had appropriate vests, two stopwatches to measure time, and a metric-strip to measure distance. For the vertical jump test, we had white chalk and a stadiometer. Also, in order to measure weight and height, we had a scale capable of measuring 100g intervals with a stadiometer capable of measuring 0,5cm intervals attached to the scale.

The Body Mass Index (BMI), stated in kg/m², was calculated using the World Health Organization standards (WHO, 1998)

PROCEDURE

First, the coach interviewed all girls to verify whether they had reached puberty (DUARTE, 1993). Weight and height of the athletes were measured and then they went through a warming up session comprised of arms and legs stretching and a low-impact jogging on the track.

The tests were conducted during three days, split along three weeks. In all tests, the athletes were properly instructed to perform the test.

Vertical jump tests were conducted at the court, by measuring height with a metric-strip attached to a wall. The athlete was positioned sideways to the wall with arms stretched up for the first measurement, then we put white chalk on her fingers and she performed 6 jumps, being 3 blockages and 3 attack jumps, marking the wall with the fingers.

The BVJ was tested initially considering that the athlete was in the upright position, feet separated laterally and arms stretched laterally at shoulder level. In continuation, a knee semi flexion and extension was performed (with arms help), trying to reach the highest spot. For the AVJ, the girls performed four steps (according to their attack preferable move). To simulate the attack move, after the approach step, the athlete made an elbow and knee flexion and extension simultaneously.

On the 40-second test the girls had to run for 40 seconds at their maximum speed, the distance was measured with a 1-meter precision up to the last foot to touch the floor at the end of time.

For the Cooper test, the girls were split into groups of 5. A whistle indicated start and end of the test, and they had to run as much as they could for 12 minutes. Distance was measured according to how many laps they were able to do, and a metric strip was used to measure the last lap.

Distance values from the test were used to estimate VO₂ max according to the following formula: VO₂max (ml.kg⁻¹.min⁻¹) = (running distance in meters – 504.9)/44.73. Tests could be interrupted at any time in case the athletes felt uncomfortable.

STATISTICAL ANALYSIS

Descriptive statistics was used to describe mean, standard deviation, min and max values. The program Bioestatic 3.0 described the statistical analysis, where we used the Pearson correlation with a significance value ($p < 0,05$).

RESULTS

Table 1 presents the sample's anthropometric characteristics. We verify that the entire group except for one participant fell within the expected values for BMI.

	Mean (sd)	Min-Max
Age (years)	12,9 ± 1,3	12 – 14
Height (cm)	1,61 ± 0,5	1,49 – 1,70
Weight (kg)	53,4 ± 5,0	44 – 60
BMI (Kg/m ²)	20,5 ± 1,9	16,9 – 24,9

Table 2 presents AVJ, BVJ, AnP and VO₂max of the group. As expected, we observed that AVJ mean was higher than BVJ mean.

	Mean (sd)	Min-Max
AVJ (cm)	34,4 ± 5,5	26 – 43
BVJ (cm)	24,6 ± 3,8	18 – 32
AnP (m)	206,9 ± 14,5	175 – 225
VO ₂ max (ml.kg ⁻¹ .min ⁻¹)	27,7 ± 7,0	17,1 – 36,2

Table 3 presents the correlations between AVJ, BVJ, AnP, VO₂max and BMI. We observed that all variables correlated to each other except for BVJ with the other physical capacities that did not correlate.

Variables	AVJ		BVJ		AnP		VO ₂ máx.		BMI	
	r	p	r	p	r	p	r	p	r	p
AnP	0,64	0,01*	0,38	0,15	-	-	-	-	-0,64	0,01*
VO ₂ max.	0,78	0,00*	0,37	0,16	0,80	0,00*	-	-	-0,78	0,00*
BMI	-0,47	0,07	-0,40	0,13	-	-	-0,46	0,08	-	-
AVJ	-	-	-	-	-	-	-	-	-	-
BVJ	0,78	0,00*	-	-	-	-	-	-	-	-

*p < 0,05

DISCUSSION

This study's goal was to evaluate and correlate the jump, AnP and VO₂ max. capacity in adolescents submitted in sportive initiation of volleyball.

The sample characteristics are shown in table 1, where it is possible to verify that the group presented the expected values. Only one individual presented BMI below normal average.

The AVJ scores in the study shown in table 2 were below the mean demonstrated for Thissen-Milder et al. (1991), where the mean demonstrated in a young female team was 37.8 cm. This difference is supposedly due to the training period of the team, which can generate a better development of the neuromuscular capacity, and consequently, better impulsion.

Comparing the AVJ and BVJ values, it is noticeable the AVJ superiority, results also found for Silva et al. (2004), when investigating high level's volleyball players. The values can be explained due to the arms displacement increase, enabling a better vertical impulsion (ROCHA et al., 2005).

The AnP mean shown in table 2, was 206.9 m, with minimum value of 175 and maximum of 225 meters. Those values are smaller results that the ones verified in a study by Soares et al. (1981) that shows value of 227.21 m for volleyball female players with 16 years old mean; and lower values than the results presented by the paulista volleyball team, from 199.23 to 250.10 m (MATSUDO; PEREZ, 1998).

Chronological and biological age, can be a factor that explains the lower results of AnP in this study, since the authors suggest that the anaerobic performance progresses with aging, where the muscular glycogen, utilization rates and hormones levels are modify ((KATCH et al., 2002; DENADAI et al., 2002).

According to Wilmore and Costill (2001), the girls VO₂ max. between 10 and 19 years old may vary from 38 to 46 mL.kg⁻¹.min⁻¹. One of the factors to consider is the training responsiveness. Evaluating volleyball athletes and students between 13 and 16 years old, Cambraia e Pulcinelli (2002), observed mean values of VO₂ max. de 38,34 mL.kg⁻¹.min⁻¹ for the athletes and 22,18 for the students, suggesting that besides the volleyball's anaerobic characteristic, the modality practice improves the aerobic capacity.

The finding values in this study are above the nom practitioners and below from the athletes with the same age,

suggesting that the practice improves the VO2 max., along with the time, type and training intensity influences, since the study sample group is composed by beginners in volleyball modality. This can characterize the beginner's group data for the modality practice.

Another point to be discussed is modality's anaerobic characteristic, evidenced for AnP and AVJ (table 2), since volleyball is characterized as anaerobic due its frequent high intensity gestures followed by low intensity moves (GABBET; GEORGIEFF, 2007).

The study points out that the variables correlated between AVJ and VO2 max. ($r=0,78$), AVJ and AnP ($r=0,64$), AVJ and BVJ ($r=0,78$) and VO2 max. and AnP ($r=0,80$), are positives, which can represent the harmonic development of the sample's group physical capacities.

The study results become important and relevant since provide standardize data, which can be used as parameter during the volleyball training processes for female adolescents.

CONCLUSION

The study concludes that for the jump capacity, the better vertical impulsion is obtained during SVJ, due to the preparatory run; and that the VO2 max. low level show an anaerobic predominance for volleyball.

The absolute values of AVJ, BVJ, AnP and VO2 max., and their respective correlations, show a harmonic development of these physical capabilities, suggesting standards values for female beginners teams which can contributes for the volleyball training process. Other studies relating these variables are needed.

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VERIFICATION OF PHYSICAL CAPACITIES CORRELATIONS IN GIRL VOLLEYBALL PRACTITIONERS.**ABSTRACT**

The volleyball popularization, a complex modality that demands from its practitioners a variety of physical capacities, contributes for the increase of the adolescents in specialized training. Nevertheless, the literature is in need of normative data for this population, which contributes for the training processes, according with the sportive modality performed. This study aimed to evaluate and to correlate the capacities of attack vertical jump (AVJ) and of blockage (BVJ), anaerobic power (AnP) and maximum oxygen consumption (VO₂ max) of adolescents submitted to the sportive initiation in the modality of volleyball. 25 girls, with age between 12 and 14 years old, from a volleyball training center took part in this study. The tests used were the vertical jump, 40 seconds and Cooper. The program Bioestatic 3.0 described the statistical analysis, where we used the Pearson correlation with a significance value ($p < 0,05$). The average values found were: 34,4 cm for AVJ, 24,6 cm for BVJ, 206,9 m for AnP and 27,7 mL.kg⁻¹.min⁻¹ for VO₂ max. The significant correlations were: AVJ and VO₂ max. ($r = 0,78$), AVJ and AnP ($r = 0,64$), AVJ and BVJ ($r = 0,78$) and VO₂ max and AnP ($r = 0,80$). The study concluded that the absolute values of AVJ, BVJ, AnP and VO₂ max, and their respective correlations, show a harmonic development of these physical abilities, suggesting normative values for female beginner's teams who can contribute in the training of volleyball.

KEY-WORDS: adolescents. physical capacities. volleyball.

VÉRIFICATION DE LA RELATION DES CAPACITÉS PHYSIQUES FILLES DES PRATICIENS DE VOLLEY-BALL. RÉSUMÉ

La démocratisation du volleyball, une discipline complexe qui requiert de ses pratiquants de nombreuses capacités physiques, a contribué à l'augmentation du nombre d'adolescents suivant une formation spécialisée. Néanmoins, la littérature a besoin de données pour cette population, pour contribuer aux processus de formation, en fonction de la discipline sportive pratiquée. Cette étude a eu pour but d'évaluer et d'identifier les corrélations entre les capacités de saut d'attaque vertical (AVJ) et de défense (BVJ), la puissance d'anaérobie (AnP) et la consommation maximum d'oxygène (VO₂ max) d'adolescents suivant une initiation sportive au volleyball. 25 filles, âgées de 12 à 14 ans, membres d'un centre d'entraînement au volleyball ont pris part à cette étude. Les tests utilisés dans cette étude ont été le saut vertical, 40 secondes et Cooper. L'analyse statistique a été conduite grâce à l'application logicielle Bioestatic 3.0, avec laquelle nous avons utilisé un coefficient de corrélation de Pearson avec une valeur significative ($p < 0,05$). Les valeurs moyennes trouvées ont été : 34,4 cm pour l'AVJ, 24,6 cm for le BVJ, 206,9 m for l'AnP and 27,7 mL.kg⁻¹.min⁻¹ pour le VO₂ max. Les corrélations significatives ont été: AVJ et VO₂ max ($r = 0,78$), AVJ et AnP ($r = 0,64$), AVJ et BVJ ($r = 0,78$) et VO₂ max et AnP ($r = 0,80$). L'étude a conclu que les valeurs absolues to AVJ, BVJ, AnP et VO₂ max, et leurs corrélations respectives, démontrent un développement harmonique des capacités physiques, suggérant des valeurs normales pour des équipes féminines débutantes, qui peuvent contribuer à leur entraînement de volleyball.

MOTS-CLÉS: adolescents. capacités physiques. volley-ball.

VERIFICACIÓN DE LA RELACIÓN DE LA CAPACIDAD FÍSICA EN LAS CHICAS PRACTICANTES DEL VÓLEI RESUMEN

La masificación del vóley, una compleja modalidad que demanda de sus practicantes una variedad de capacidades físicas, ha contribuido a la especialización del entrenamiento en adolescentes. Sin embargo, la literatura requiere una normativa para esta población, que ayude al proceso de entrenamiento, a respecto de la modalidad del deporte realizado. Este estudio tiene la intención de evaluar y darle correlación a las capacidades del ataque con salto vertical (ASV) y al bloqueo (BSV), al poder anaeróbico (PAn) y a la capacidad máxima de consumo de oxígeno (VO₂ max) de los adolescentes involucrados en la iniciación de la modalidad del vóley. Han formado parte de este estudio: 25 chicas, de edades entre 12 y 14 años, integrantes de un entrenamiento de vóley. Las pruebas realizadas para este estudio fueron las de 40 segundos y las Cooper. El análisis estadístico fue descrito por el programa Bioestatic 3.0, en donde se usó la correlación Pearson con una importancia de valores mayores a $p < 0,05$. El promedio de valores hallados fue: 34,4cm para ASV; 24,6 cm para BSV; 206,9 m para PAn and 27,7 mL.kg⁻¹.min⁻¹ for VO₂max. Las mayores correlaciones halladas fueron: ASV y VO₂ max. ($r = 0,78$); ASV y PAn ($r = 0,64$); ASV y BSV ($r = 0,78$); y VO₂max. y PAn ($r = 0,80$). La conclusión del estudio fue que los valores absolutos de ASV, BSV, PAn y VO₂ maximos y sus respectivas correlaciones, muestran un armonico crecimiento de estas habilidades físicas, gracias al valor de las normativas o reglas aplicadas en el entrenamiento de los equipos de mujeres principiantes.

PALABRA CLAVE: adolescentes. capacidades físicas. vóley.

VERIFICAÇÃO DA RELAÇÃO DE CAPACIDADES FÍSICAS, EM MENINAS PRATICANTES DE VOLEIBOL. RESUMO

A massificação do voleibol, modalidade complexa que exige de seus praticantes diversas capacidades físicas, contribuiu para o aumento da participação de adolescentes em treinamentos especializados. No entanto, a literatura carece de dados normativos para esta população, que contribuam para o processo de treinamento, de acordo com a modalidade esportiva praticada. Este estudo objetivou avaliar e correlacionar as capacidades de salto vertical de ataque (SVA) e de bloqueio (SVB), potência anaeróbia (PAn) e consumo máximo de oxigênio (VO₂ máx.) de adolescentes submetidos à iniciação esportiva na modalidade de voleibol. Participaram do estudo 25 meninas de um centro de treinamento, com faixa etária de 12 a 14 anos. Foram utilizados os testes, de salto vertical, de 40 segundos e de Cooper. A análise estatística foi descrita através do programa Bioestatic 3.0, onde utilizou-se a Correlação de Pearson com valor de significância ($p < 0,05$). Os valores médios encontrados foram: 34,4 cm para SVA, 24,6 cm para SVB, 206,9 m para PAn e 27,7 mL.kg⁻¹.min⁻¹ para VO₂ máx. As correlações significativas foram: SVA e VO₂ máx. ($r = 0,78$), SVA e PAn ($r = 0,64$), SVA e SVB ($r = 0,78$) e VO₂ máx. e PAn ($r = 0,80$). Conclui-se que os valores absolutos de SVA, SVB, PAn e VO₂ máx., e suas respectivas correlações, evidenciam um desenvolvimento harmônico destas capacidades físicas, sugerindo valores normativos para equipes femininas iniciantes, que podem contribuir no processo de treinamento do voleibol.

PALAVRAS-CHAVE: adolescentes. capacidades físicas. voleibol.