14 - PHYSIOLOGICAL AND NEUROMOTOR ASPECTS OF THE ATHLETE CHILD: A VIEW OF THE SPORT SCIENCE

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INTRODUCTION

The athlete child in his/her process of growth and development presents sudden changes, that influence performance in the practiced sport. Thus, it becomes necessary to identify the main physiological and neuromotor aspects involved in this process.

The previous knowledge of these factors could contribute to a better management of the training program, looking for a better effort balance according to the possibilities and limits of different age range, and better results to the sport coach and parents interference, searching to stimuli the practice with higher probabilities of a more efficacy on performance.

This study could contribute with the sport coach to propitiate more reliable information related to the physiological and neuromotor behavior of the athlete child, and better training program to a specific sport.

OBJECTIVE

The purpose of this study is to analyze the main physiological and neuromotor aspects of the athlete child involved in the competitive practice.

METHODOLOGY

This is a literature review study, identifying the positioning of the researchers about what was published and what still remains to be made in the study variables. For that, it was used different research sources, such as original articles published in specialized journals, articles and abstracts published in scientific events, and data base available at Central Library of State University of Londrina, as SPORT DISCO, LILACS, BIREME, PORTAL DA CAPES, SCIELO and MEDLINE.

RESULTS

It was possible to identify in the related literature the physiological and neuromotor variables in children that participate in sport activities:

1. Aerobic and Anaerobic Exercise

The child energy expenditure depends upon the basal metabolism, growth velocity, body composition, age and level of physical activity (PINHO; PETROSKI, 1997). Brito et al. (1999) investigated children and adolescent in the age range of 9 to 15 years of age and the results indicated a stability level from moderate to high in the motor variables. However, the Maximum Oxigen Consumption (VO_{2max}) demonstrates instability in this period of life, and the anthropometric measures demonstrates stability. In general, children basal metabolism is 20% higher when compared to the adults (RAMOS, 1998).

The athlete children have a lower ability to produce high intensity anaerobic power, and their localized resistance strength is lower when compared to the adult athletes. This can be observed in the children low performance in short and long sprints, jumps and throwing. On the other hand, they achieve the steady-state in the beginning of the intense exercise and present a faster recovery than adults after these exercises. Children can require lower periods of relaxation than adults. They take longer to heat adaptation, and their daily training volume should be lower than the adult. Their thermoregulation is lower, therefore, the water replenishment should be immediate (BAR-OR, 1995).

2. Muscular Strength

Muscular strength is the capacity to exert a determined pressure against a resistance. The specific and individualized training, when supervised by specialists can propitiate a considerable muscular strength gain, and contribute favorably to health promotion and children quality of life (DeOLIVEIRA, 2003). The children muscular strength can be effectively improved related to the coordinative components and the neuromuscular activation building up the locomotor apparatus (RISSO; LOPES; OLIVEIRA, 1999). The children´s muscular strength training indicate that there are not epiphysial changes in the long bones, during 4 weeks of adaptation period and 12 weeks of training with weight of 80% of 1 Maximum Repetion (MR), according to Lopes (2003).

Exercise with appropriate weight to the organism possibilities influence favorably in the body composition and improve the young organism different systems (FIORESE, 1989). The neural and hormonal adaptations can influence in the muscular strength gains in prepubescent boys and girls significantly with continuous training, with few or no hypertrophy. Part of this changes are related to the muscle, nerve and connective tissue improving the muscular tissue quality and neuromuscular unity (BLIMKIE et al., 1989).

3. Flexibility

The flexibility has the purpose to increase the angle of joint motion. Ross and Gilbert (1985); and Ross and Pate (1987) suggested that the flexibility performance is better in girls than in boys, in the age range from 6 to 10 years of age. A greater improvement occurs in girls after 10 years of age, continuing to 16 years. In boys occur an improvement, starting from 14 and continuing to 17 years. The performance is different between males and females at all ages favoring girls, in general around 2,5 cm in the lower ages, increasing during puberty to 7,6 cm (National Children and Youth Fitness Studies).

During growth occurs an increase of bone mass in the epiphysis followed by muscle mass increase. In function of this fact, occurs a decrease of flexibility, especially during preadolescence. Children and adolescents can reduce their flexibility levels if they do not do specific work out to improve them, occurring a variability in terms of performance during growth spurt. In general occurs a superior performance from 6 to 9 years, decreasing after 12 years of age (HAYWOOD, 1993).

4. Balance

Balance is an ability needed to maintain determined postures, being static or dynamic, against the force of gravity, and it has fundamental importance to execute daily tasks, and in a special way the sport skills.

DeOliveira; Gallagher; Oyen (2005) investigated the influence of sport experience and selective attention on balance control development. Ninety children participated in the study, from 6-, 12-, and19-years old, female gymnasts and other sport modalities athletes, with a minimum of 2 years of experience. It was analyzed 4 motor tasks: walking on a line, crossing over an obstacle, walking on a balance beam at 30 cm from the floor, and crossing over an obstacle on the balance beam. The measurements involved 3 tri-axial accelerometers that analyzed movement acceleration (amplitude, frequency,

root mean square and smoothness index), in the anterior-posterior, medial-lateral, and vertical planes. The results indicated that the more experienced children presented better results when compared to their peers in the same age range, and also when compared to the older group, that did not have the same experience level ($p<0.05$). When children with less experience received selective attention cues to remain in balance, looking at the end of the line or at the end of the beam, their performance were similar to the more experienced groups. When the complexity level of the tasks increased balance decreased to all age groups, independent of experience. However, the difference between groups were higher in the simplest motor tasks (walking on the floor and without obstacle), suggesting a better motor coordination level and movement smoothness, in function of the sport practice and the use of a selective attention strategy.

CONCLUSIONS

The changes involved in the child growth and development can make the difference in terms of sport performance. Besides the genetic factors, the environmental factors can contribute to this improvement, especially practice and specialized training influencing performance in the physiological and neuromotor variables.

It is professional responsibility to interfere to the higher performance possible respecting the limits and capabilities of the children, and furthermore their variability in function of the growth and development process.

The sport program can be more feasible and precise identifying with higher reliability the characteristics of each sport modality and the prevalence of its specific physiological and neuromotor variables, and achieve a higher sport performance.

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PHYSIOLOGICAL AND NEUROMOTOR ASPECTS OF THE ATHLETE CHILD: A VIEW OF THE SPORT SCIENCE

The knowledge about the athlete child, in process of growth and development is extremely important to the sport coach, aiming a better planning and training balance, fitted to the needs and limits of the child. Thus, the purpose of this study is to analyze the main physiological and neuromotor aspects of the athlete child involved in the competitive practice. This is a literature review, and the search was made for original papers in specialized journals, articles and published abstracts in scientific events, and data base available at State University of Londrina, Paraná, such as SPORT DISCO, LILACS, BIREME, PORTAL DA CAPES, SCIELO and MEDLINE. It were analyzed the variables involving the aerobic and anaerobic exercise, strength, flexibility and balance, emphasized in most of the sports. The results indicated that the variables behavior can make the difference aiming the best sport performance, and furthermore the genetic, experience and specific training. The sport coach should observe the specificity of the practiced sport, and intervene respecting the limits and capacities of the sport child being aware of the great variability presented in this age range, in function of the growth and developmental changes. It is possible to have a better organization of the training identifying these characteristics more precisely, and maximizing the athlete child performance.

Key words: Neuromotor and physiological aspects, sport child, sport science.

APSECTS PHYSIOLOGIQUES ET NEUROMOTEURS DE L'ENFANT SPORTIF : UN BREF SURVOL DE LA SCIENCE DU SPORT

Afin de pouvoir planifier et doser l'entraînement adéquat aux besoins et limites de l'enfant sportif en phase de croissance et de développement, il est primordial pour l'entraîneur de s'assurer de la pleine connaissance de cet enfant. Ainsi, l'objectif de cette étude est d'analyser les principaux aspects physiologiques et neuromoteurs de l'enfant sportif habitués à des compétitions. Ce travail se caracterise comme une revision bibliographique ayant comme source de recherche des articles de périodiques spécialisés, des articles et des resumés publiés dans le annales d'événements scientifiques et des banques de données mis à disposition à l'Université de l'Etat du Paraná tels SPORT DISCO, LILACS, BIREME, PORTAL DA CAPES, SCIELO et MEDLINE. Les variantes concernant l'exercice aérobic et anaérobic, la force musculaie, la flexibilité et l'équilibre, prédominants dans la grande majorité des sports, ont été ici analysées. Au délà de la génétique, de l'expérience et de l'entraînement spécialisé, le comportement de ces variantes peut apporter une différence laquelle favorise une meilleure performance sportive. C'est alors à l'entraîneur d'observer la spécificité du sport pratiqué pour ainsi intervenir dans le respect des limites et des capacités de l'enfant sportif. Il lui faut également être très attentif à la grande variabilité présente à cette tranche d' âge liée aux changements de la croissance et du développement. Une fois que ces cacartéristiques sont identifiées avec une grande précision, il est alors possible de planifier un meilleur entraînement et de développer à son maximum la performance de l'enfant sportif.

Mots clés : Aspects physiologiques et neuromoteurs , enfant sportif, science du sport.

ASPECTOS FISIOLÓGICOS Y NEUROMOTORES DEL NIÑO DEPORTISTA: UNA LIGERA MIRADA DE LA CIENCIA DEL DEPORTE

El conocimiento del niño deportista, en fase de crecimiento y desarrollo es de fundamental importancia para el técnico deportivo, dirigida a una mejor planificación y dosis del entrenamiento, adecuado a las necesidades y límites del niño. El objetivo de este estudio es analizar los principales aspectos fisiológicos y neuromotores del niño deportista inserido en la práctica competitiva. Este trabajo se caracteriza como revisión bibliográfica, teniendo como fuentes de investigación artículos originales de periódicos especializados, artículos y resúmenes publicados en anales de eventos científicos, y bancos de datos disponibles en la Universidad Estadual de Londrina, Paraná, tales como SPORT DISCO, LILACS, BIREME, PORTAL DA CAPES, SCIELO e MEDLINE. Fueron analizadas las variables que envuelven el ejercicio aeróbico y anaeróbico, la fuerza muscular, la flexibilidad y el equilibrio, predominantes en la gran mayoría de los deportes. Los resultados indicaron que el comportamiento de esas variables pueden hacer la diferencia con el objetivo de obtener el mejor desempeño en el deporte, además de la genética, de la experiencia y del entrenamiento especializado. Cabe al técnico deportivo observar la especificidad del deporte practicado e intervenir respetando los límites y capacidades del niño deportista, observando la gran variabilidad presentada en esa quinta, en función de cambios en el crecimiento y desarrollo. Identificando con una mayor precisión esas características, se puede planificar mejor el entrenamiento, y maximizar el desempeño del niño deportista.

Palabras claves: Aspectos fisiológicos y neuromotores, niño deportista, ciencia del deporte.

ASPECTOS FISIOLÓGICOS E NEUROMOTORES DA CRIANÇA ESPORTISTA: UM BREVE OLHAR DA CIÊNCIA DO ESPORTE

O conhecimento da criança esportista, em fase de crescimento e desenvolvimento é de fundamental importância para o técnico desportivo, visando um melhor planejamento e dosagem do treinamento, adequado às necessidades e limites da criança. Logo, o objetivo deste estudo é analisar os principais aspectos fisiológicos e neuromotores da criança esportista envolvida na prática competitiva. Este trabalho se caracteriza como revisão bibliográfica, sendo fontes de pesquisa artigos originais de periódicos especializados, artigos e resumos publicados em anais de eventos científicos, e bancos de dados disponíveis na Universidade Estadual de Londrina, Paraná, tais como SPORT DISCO, LILACS, BIREME, PORTAL DA CAPES, SCIELO e MEDLINE. Foram analisadas as variáveis envolvendo o exercício aeróbico e anaeróbico, a força muscular, a flexibilidade e o equilíbrio, predominantes na grande maioria dos esportes. Os resultados indicaram que o comportamento dessas variáveis podem fazer a diferença visando o melhor desempenho no esporte, além da genética, da experiência e do treinamento especializado. Cabe ao técnico desportivo observar a especificidade do esporte praticado, e intervir respeitando os limites e capacidades da criança esportista, observando a grande variabilidade apresentada nessa faixa etária, em função de mudanças no crescimento e desenvolvimento. Identificando com maior precisão essas características, se pode planejar melhor o treinamento, e maximizar o desempenho da criança esportista.

Palavras chaves: Aspectos fisiológicos e neuromotores, criança esportista, ciência do esporte.