129 - THE BENEFITS OF TRAINING NEUROMUSCULAR FOR CHILDREN AND ADOLESCENTS.

ROBERTA APARECIDA RIBEIRO NASCIMENTO
HELDER DE SOUZA TAVARES
ESCOLA DE EDUCAÇÃO FÍSICA E DESPORTOAS DA UNIVERSIDADE FEDERAL DO RIO DE JANEIRO RIO DE JANEIRO, RJ - BRAZIL

INTRODUCTION

In last the ten years, the training of force for children has gotten great acceptance and popularity enters the professionals of Physical Education, Doctors and Scientists. However, questionings exist that cause controversies, example: the force training harms the lever system of the children? The force training can cause profits of muscular force in the children? These questions are reasons of many current research. However, the children are ripening constantly, and what he is not appropriate for a daily pay-pubescent one, she can be appropriate for an adolescent. The answers for these and other questionings are serious concerns of the academic world and the parents, therefore many concepts make a mistake to the force training, its risk and as it can be adapted for young children and (HAMIL, 1994; KRAEMER and FLECK, 1993).

The majority of the children if benefits with the program of force training to help in the improvement of the physical conditioning, performance in the sport or to reduce the probability of injuries during the sporting and recreation activities. Paradoxically, diverse competitive sport activities in which the children participate, predispose use in a risk of very bigger injury of the one than the force training. The benefits of one program of appropriate training of force, planned and supervise, reveal superior to the risks of injuries (HAMIL, 1994).

The National Association of Force and Conditioning, American the Orthopedic Society for the Medicine of the Sport and the American Academy of Pediatrics, suggest that the children can benefit themselves of a program of training of force correctly prescribed and supervised. Therefore, a deep knowledge on the alterations that the body of the child suffers during the growth phase, as well as, how these alterations influences in the physical capacity and in the reply to the exercise, it is of great value for a program of safe and healthful resisted exercises. Therefore, the children if differ from the adults in metabolic, cardiovascular, thermal regulation and percipient the answers to the exercise (CAMPOS, 2000).

The physical growth can be defined, in accordance with Waechter and Blake, (1976) as: "it is the quantitative or measurable aspect of the growth of the individual". The development is characterized by the qualitative aspects or behavior of the gradual adaptation of an individual to the environment, one of the pointers is the biggest resultant functional capacity of the domain of several other lesser abilities; or either, acquired experiences previously (POTTER and PERRY, 2002). Already the maturation is the process of complete development and growth. It involves the biological dimensions, normal alterations in the functions and the learning of more mature behaviors. The maturation process influences the sequence and the chronology of the qualitative alterations and quantitative associates to the growth and development (POTTER and PERRY, 2002).

REVISION OF LITERATURE

The height quickly increases during the five first two years of life and the child generally, reaches 50% of height of an adult (TANNER, 1962). Of as the year in front, the growth already is slower and gradual, during all infancy. Already in the phase of the daily pay-puberty it has a new increase of the growth. The growth tax highest is reached by return of twelve - thirteen years for girls and of the fourteen - fifteen years for the boys. The weight also follows the standard of the height, with relation to the period where more it is modified, being for return of twelve - thirteen years for girls and fourteen - fifteen years for the boys. However, the girls ripen more early of the one than the boys (CAMPOS, 2000).

In the start of the fetal development, the majority of the bones starts if to develop from hyaline cartilage. During the fetal period and also by all the growth phase, membranes and cartilages are transformed into bone, through a called process ossification. Soon after the birth, the child presents, in long bones, one diaphysis bone and two epiphyseal cartilaginosas. These if ossify, leaving a cartilage record that if calls epiphyseal plate. It is this record that allows to the bone the longitudinal growth. In accordance with Campos (2000), the bone growth is interrupted when the epiphyseal plates are substituted by bone. The period of ossification of epiphyseal plates varies between the bones and enters the extremities of the same bone. One of the forms to analyze the bone age is through the biacromion diameter that, between girls and boys next averages very present until the 13,2 years. Despite the girls presenting a tax of bigger annual growth of the 8,5 until the 12 years. Later, of the 13 years the boys continue to present an acceleration in the biacromion growth, this growth of the biacromion diameter are one of the phenomena clearest of the sexual dimorfism, when girls and boys start to present the adult corporal form (CRASSELT, 1988).

After the first year of after-Christmas life, the muscular system initiates the process of specific and individual distribution of staple fibres of fast contraction and staple fibres of slow contraction (CAMPOS, 2000).

The distribution of muscular staple fibres genetic is determined and not easily modified, however, a program of adequate training will have a bigger effect in the metabolic potential of the muscle, independently of the types of staple fibres gifts. The main functional characteristic that differentiates them is the speed of contraction and relaxation. (MAUGHAN, et al., 2000).

Since the birth until the adolescence, the fabric muscular is in continuous increase. The phase of peak of the muscular development is the puberty. The increase of the muscular mass with the age is a result of the increase of the myofilaments and myofibrils. The increase of the length of the muscle, to follow the bone growth, must to the increase in the number of sarcomere and to the increase of the length of the existing sarcomere's already (CAMPOS, 2000).

Shephard (1982) affirmed that in the life after Christmas, the increase in muscular staple fibres if must to the increase in the cytoplasmic content probably for the increase in the number of residual nuclei that had left the cells that had formed muscular staple fibres during the embryonic life - cells satellites. Malina (1986) affirms that diameter's muscular staple fibres with greater, possess greater number of nuclei concluding that the growth of a fiber in length and thickness this associate to an increase of nuclei.

The apex of muscular mass in the girls is for return of the sixteen and twenty years, already in the boys it is a little later, for return of the eighteen and twenty and five years. The muscular hypertrohy is more difficult to happen in the when comparative children to the adults. The profit of force in infancy and the adolescence more is related with the neural adaptations of that with increase of the area of transversal section. The increase of muscular mass, in reply to the resisted exercise, starts to be sharper after the adolescence (CAMPOS, 2000).

The endocrine system possesss a direct relation with the growth, the motor performance and also with the corporal composition. The endocrine glands directly secrete hormones (messenger chemistry) in the blood, that carries them until the fabric where they go to exert its effect. The linking of the hormone to a specific protein receiver allows that the hormone exerts its effect. Thus, the hormone circulates for all fabrics and directly affects the ones that possess the specific receiver, the cell-target (POWERS and HOWLEY, 2000). The three main groups that participate directly of the infantile growth are: adrenal's hormones, thyreoid hormones and gonadais hormones (CAMPOS, 2000).

Between adrenal's hormones, the hormone of the growth is most important, therefore it controls the longitudinal growth during all infancy and adolescence (CAMPOS, 2000). The hormone of the growth, in contrast to other hormones, does not function by means of gland-target, but it directly exerts its effect on all, or almost all, the fabrics of the body (Guyton and Hall, 2002).

The gonadais hormones help in the longitudinal growth and also they affect the sexual maturation, developing the respective sexual agencies (CAMPOS, 2000). The steroid exert a significant influence on the long distance of the puberal growth, while the absence of these factors is not important in the daily pay-pubescent growth. The sexual steroid and adrenal glands in excess can cause a sudden increase of the speed of growth and, also, the premature sprouting and the progression of secondary sexual characteristics. If not to diminish, the increased sexual steroid will cause the advance of the bone age, premature fusing of epiphyseal and low stature of the adult (GREENSPAN and STREWLER, 2000).

The estrogens secrete in bigger amount in the adolescent girls promote greater accumulation of fabric in fat tissue. The groups of cited hormones above manage the growth and the development for stimulaton of protein anabolism, what it results in the necessary substance retention to the construction of fabrics (CAMPOS, 2000).

The training to neuromuscular, or conditioning to neuromuscular embody a set of methods and procedures that they aim at to train the locomotive device of the athlete and the interaction to neuromuscular, of form to provoke adaptations in muscle level or muscular group, in this way, to allow one better porting performance. In contrast of the first one, the training to neuromuscular if also bases on the located load application objectifying located effect (DANTAS, 2003, P. 159).

The work of the preparation to neuromuscular, according to Dantas (2003), citing Matheus and Fox (1983), will have the following basic effect on muscular staple fibres: * Increase in the concentrations of muscular creatina (39%), the CP (fosfocreatina) (22%), of the ATP (18%) and the glycogen (66%); * Increase in the glycolytic enzymatic activities (phosphofructokinase or PKF; phosphorylase; hexokinase); * Reduction in the volume of mitochondrian due to the increase in the size of myofibrils and the sarcoplasmatic volume; * Selective hypertrohy of staple fibres of fast contraction; * Adaptations in the nervous system including the modifications in the standard of conscription and the synchronization of the motor units.

Dantas (2003, p.169) still emphasizes that the specifying of the training will influence the intensity of these and other adaptations in muscular staple fibres, adjusting it the type of perfomance.

One of the evident alterations of the force training is the increase of the muscular mass and that the amount of force that can be generated by a muscular group is proportional to the transverse area of the muscle. Consequently, bigger muscles apply bigger force of the one than the minors. Many scientists believe that the increase of the size of the muscle by means of the resistance training must it However the hypertrophy (increase in the diameter of muscular staple fibres decurrent of the increase of myofibrils), Powers citing Goyea and associates argue that the muscles also can increase of size in reply to the training of force by means of the hyperplasya (increase of the number of muscular staple fibres). Although this question remains controversy, it seems that great part of the increase of the size of the decurrent muscle of the force training occurs by means of the hypertrophy.

Which is the cause for the increase of muscular force in children? In accordance with scientific studies, the profits of force in children are evidenced by the increase in the neural adaptations, perfectioning of the functional capacities of the nervous system. In contrast of the adults, who if evidence for the increase of the muscular volume of the individual. Being thus, the hypertrophy is more difficult of if observing in children, mainly daily pay-pubescent, of whom in adults (Fleck and Kraemer, 1999).

It seems that the accented growth of the muscle in reply to the force training can start after the adolescence, when the hormones profiles of men and adult women start to appear (Kraemer and Fleck, 1993). In the puberty, the influence of the testosterone, in the men, the size and force of the muscle, without any training, is amazing. One of the more important masculine characteristics consists of the development of musculature increased, the average increase of 50% in the muscular mass in relation to the feminine one. This increase of the muscular mass also is associated with the increase of proteins in the not muscular parts of the body. Many of the alterations of the skin must to the protein deposition in the skin (Guyton and Hall, 2002). Thus, it seems that after the puberty has beginning the capacity of the force training to increase muscular hypertrophy beyond the normal growth (Fleck and Kraemer, 1999).

Although, the increase in the muscular mass (hypertrophy) cannot occur in children of all the ages, many other changes can occur in the muscle, conjunctive nerve and fabric, as the increase in the quality of the fabric muscular and the motor unit. The changes in the standards of conscription of the muscular protein and in the fabric conjunctive could contribute for the perfectioning of the force (Fleck and Kraemer, 1999).

According to Fleck and Kraemer (1999),

"(...) many research on the subject in the last years has demonstrated of not-conclusive form that occur profits in muscular force in children, from the force training, comparing these children with whom had not carried through this training". (FLECK; KRAEMER, 1999p. 185)

. Legwold apud Fleck and Kraemer (1999) says that:

"(...) the opponents to the training of force for children argued that little or no profit in force or muscular hypertrophy (beyond that one caused by the normal growth) could be reached in the daily pay-pubescent ones due to immaturity of the hormonal system ". (FLECK; KRAEMER, 1999p. 185).

The absence of alterations in the muscular force found by some studies, perhaps must it the evil unsatisfactory planning of the force training or experimental planning. Already in the current studies it can be perceived profits of force in daily pay-pubescent children, from the force training. Moreover, the research affirms that it does not have risks of injuries due to this training (FLECK and KRAEMER, 1999).

The muscular force is increased in accordance with the neural increase of the muscular mass and adaptations, with the age. Or either, increasing or diminishing the number of active motor units in data moment, amount of force produced for a muscle gets excited it. Constant increases in the muscular tension could be produced with the gradual increase of the activity of the axon that establish effector with the excellent sets of inferior motor neurons. This gradual increase in the tension results of the conscription of motor units (PURVES and et al., 2005).

The necessity of continuous training can be an important factor when daily pay-pubescent they participate of the force training. Therefore, any advantage in caused by the training disappears quickly, therefore children previously trained lose trained status in the same way that adult (BLIMKIE, 1993).

DISCUSSION

At this moment, we will go to answer the questions most popular between the professionals of the health, on the training of force for children. The force training harms the normal growth of the child? The force training can really cause profits of muscular force in the children?

Per many years, the use of the weight lift as physical activity for children was reason of great quarrel. The adolescents and the children were discouraged to make weight lift, with fear of that they could injure itself and/or had the interrupted growth. Currently great emphasis has been given to the effect of the sporting physical activity on the bone mass, therefore the vigorous exercise exerts a basic paper in the process of profit of bone mass.

The development of the bones of the children can be intensified with force exercises. The force training increases the muscular tension, coefficient of tension and compression, that are important to stimulate the modeling of the bone (CONROY et al., 1992). The peak of bone mass can be said that the impact of the vigorous physical exercise on the bone mass is excellent during the adolescence, when is for being reached. The increase of the bone mineral density during the puberty must primary to the expansion of the bone size in function of physical growth e, later, for the increase of the cortical thickness (SILVA, 2003).

The force training helps to prevent injuries in adults. Some evidence also exists of that it helps to prevent injuries in adolescent athletes (HEJNA et al., 1982). The possibility of acute or chronic injuries in the cartilage of the growth of children, the concern is valid. Many times injuries caused for force training are resulted of inadequate training.

Some authors tell that an increment of 3 5% in the bone mineral density results in the reduction in the risk of breakings in the order of 20 30%. Moreover, he has evidences of that the effect of the physical exercise on the bone mass, next to the maximum peak to the speed of the growth, either the period most effective to make potential the profit of bone mass, when compared with carried through physical exercises only in the final phase of the adolescence (SILVA, 2003).

For Nordström et al. (1995), exists strong association between the bone mass and force of the adjacent muscles. Thus, increment of the muscular mass is reflected in an increase of the bone mass, or either, the muscles, a time stimulated, will go to unchain osteoblastic increase, in the bone region next to the place where if they insert.

The majority of the injuries, caused for the practical one of the weight lift is on to the precarious technique of execution of the exercises, to the intensity of the exercises, incompatible with the age of the child, to the wrong choice of the exercises in the phase adaptation, to the lack of orientation and accompaniment of a competent professional. Therefore, besides knowing that the injuries are possible to happen, it is important to know as the injury happens, for thus, to know as to prevent it (CAMPOS, 2000).

The children if adjust well to the weight lift exercises and, the injuries related with the resisted exercises, in the majority of the research are minimum or they practically do not occur. The reasons for which the children if exercise are well different of the ones of the adults. Therefore, we must take care of the necessities of each child, it needs to develop the cardiovascular conditioning, motor flexibility and abilities, as well as the force. The children if exercise for diversion, to have recognition and social interaction while that the adults if exercise for reasons of aesthetic health and. With this, one perceives that one program of training of force for children does not have to consume as much time that it arrives to ignore these other aspects of conditioning in the development of a child and to intervene with its time to play.

The training program must be planned for the necessities of each child and used the techniques of exercises and appropriate consideration of security. One program of training of force adequately planned and supervised can supply many physical and psychological benefits the child (FLECK and KRAEMER, 1999).

Some factors that influence the vision of the child on the resisted training are the interest, the maturity, the growth, the capacity of agreement and the influence of the parents (CAMPOS, 2000).

CONCLUSIONS

The weight lift has proven being a half cash to improve the physical conditioning of children, independent of the age band. The used characteristics for the assembly of the weight lift program must be seemed the ones of the program of an adult (CAMPOS, 2000).

One programs basic of training for children structuralized well and supervised it does not need to be longer the one than the 20 60 minutes for session, three times per week. As the child is older, more advanced programs can be developed. The child must initiate with a basic program of force training that exercises all the main muscular groups and the muscles around each joint of the body. Exercises of heating, in return to the calm and of flexibility must be part of each session. It is not necessary to make no important distinction enters the programs between boys and girls (Fleck and Kraemer, 1999).

Had limited anaerobic capacity, and of thermo regulation, the children if adjust better to the training of the interval type. This type of activity, that is typical of the weight lift, if incases well to the small interval of attention that the child obtains to keep (CAMPOS, 2000).

The exercises must in accordance with be chosen the age band of the child, with the level of conditioning, the level of knowledge and coordination, as well as the previous experience. For example, if the child never practised weight lift and possess ten years of age, its program will have to contain exercises of easy coordination and assimilation of the movement and of preference with free weights (the majority with the weight of the body), therefore the conventional devices of weight lift is not adjustable for so small children (CAMPOS, 2000).

At last, until some years behind the force training was not advisable for children, therefore they thought that the growth could be compromised, through injuries about the bones. Moreover, they found that the children were incapable to gain force beyond the normal standard of growth. Happily, current research shows that the force training promotes profits in force, the bone development can be increased e, to leave of this can be prevented injuries with the adequate training of force. But, for this, it is needed to lead in consideration, when planning a program of training of force, the physical differences of development and differences between the children, the physical tolerance to the exercise and the aspects of the security, in order to prevent that acute or chronic injuries happen and to make possible that the beneficial effect for the children are maximized.

ABSTRACT: The present research based on the bibliographical references will show the behavior of the some systems of the human body during the different phases of growth that, must be of extreme importance for the elaboration of a program of training for daily pay-pubescent and pubescent. In the training to neuromuscular can be stimulated some physical valences amongst these will go to destine itself to the present study, the force. Moreover, we will argue which is the cause of the increase of muscular force in children, in accordance with scientific studies. To leave of this research we could perceive that the children are capable to get profits of force beyond waited for the growth the standard, to increase the bone development thus being able, to prevent injuries with the adequate training of force.

Keys Words: growth, training of force, children.

Roberta Aparecida R. Nascimento; Helder de Souza Tavares. Universidade Federal do Rio de Janeiro Rua Guatambu, 404 Marechal Hermes, Rio de Janeiro RJ, Brasil. Telefone: (21) 2454-8240. e-mail: betinhanasc@yahoo.com.br

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THE BENEFITS OF STRENGTH TRAINING FOR CHILDREN AND ADOLESCENTS.

The present research based on the bibliographical references will show the behavior of the some systems of the human body during the different phases of growth that, must be of extreme importance for the elaboration of a program of training for daily pay-pubescent and pubescent. In the training to strength can be stimulated some physical valences amongst these will go to destine itself to the present study, the force. Moreover, we will argue which is the cause of the increase of muscular force in children, in accordance with scientific studies. From this research we could perceive that the children are capable to get profits of force beyond waited for the growth the standard, to increase the bone development thus being able, to prevent injuries with the adequate training of force.

Keys Words: growth, training of force, children.

LES AVANTAGES DE LA FORMATION NEUROMUSCULAIRES POUR DES ENFANTS ET DES ADOLESCENTS.

La recherche actuelle basée sur les références bibliographiques montrera le comportement des quelques systèmes du corps humain pendant les différentes phases de la croissance qui, doivent être d'importance extrême pour l'élaboration d'un programme de la formation pour payer-pubescent et pubescent quotidiens. Dans la formation à la force peuvent être stimulées quelques valences physiques parmi ces derniers iront se destiner à la présente étude, la force. D'ailleurs, nous discuterons ce qui est la cause de l'augmentation de la force musculaire chez les enfants, selon des études scientifiques. De cette recherche nous pourrions percevoir que les enfants sont capables pour obtenir des bénéfices de la force là-bas attendus la croissance la norme, pour augmenter le développement d'os pouvant de ce fait en mesure, empêcher des dommages avec à formation proportionnée de la force.

Clefs de mots : croissance, formation de la force, enfants

LAS VENTAJAS DEL ENTRENAMIENTO NEUROMUSCULAR PARA LOS NIÑOS Y LOS ADOLESCENTES.

La actual investigación basada en las referencias bibliográficas demostrará que el comportamiento de los algunos sistemas del cuerpo humano durante las diversas fases del crecimiento que, deben ser de importancia extrema para la elaboración de un programa del entrenamiento para diario paga-pubescent y pubescent. En elentrenamiento a la fuerza se pueden estimular algunas valencias físicas entre éstos irán a destinarse al actual estudio, la fuerza. Por otra parte, discutiremos cuál es la causa del aumento de la fuerza muscular en niños, de acuerdo con estudios científicos. De esta investigación podríamos percibir que los niños son capaces conseguir beneficios de la fuerza más allá esperados el crecimiento el estándar, para aumentar el desarrollo del hueso así que puede, prevenir lesiones con el entrenamiento adecuado de la fuerza.

Llaves de las palabras: crecimiento, entrenamiento de la fuerza, niños.

OS BENEFÍCIOS DO TREINAMENTO NEUROMUSCULAR PARA CRIANÇAS E ADOLESCENTES.

A presente pesquisa fundamentada nas referências bibliográficas mostrará o comportamento dos vários sistemas do corpo humano durante as diferentes fases de crescimento que, devem ser de extrema importância para a elaboração de um programa de treinamento para pré-púberes e púberes. No treinamento neuromuscular pode-se estimular várias valências físicas dentre essas irão se destinar ao presente estudo, a força. Além disso, discutiremos qual é a causa do aumento de força muscular em crianças, de acordo com estudos científicos. A partir dessa pesquisa pudemos perceber que as crianças são capazes de obter ganhos de força além do esperado pelo crescimento padrão, aumentar o desenvolvimento ósseo podendo assim, prevenir lesões com o treinamento de força adequado.

Palavras Chaves: crescimento, treinamento de força, crianças.