40 - BASIC KNOWLEDGE ON MUSCULAR EXPANSION, AND INSERTION OF THE PROFESSIONALS OF PHYSICAL EDUCATION: BIBLIOGRAPHICAL RESEARCH

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INTRODUCTION

The significant part of this study discourses about muscular composition, neuromuscular function and the mechanism directly involved to the adaptive process front to the stimulations and immobilization of expansion.

The physiological and methodological characteristics conduct the flexibility training through the expansion. The specific and scientific knowledge of this subject has to do with the importance that is attributed by this professional, as well for the great use of this technique, without a safe information to its beneficiaries.

The curricular interaction must perceive the system of valuation of the society, considering with clarity the contents toward the reality of the professional necessities, searching the facilitation of the professionals of Physical Education in the work market.

This affirmation corresponds with Tojal's (2000) reflections that emphasizes the need for professional of Physical Education to combine the way of performance to acquire its professional effectiveness. In this way it is necessary for changes to scheduled adaptations, for the development of a generic base specific of knowledge of performances chosen by the conditions of work market.

The main effects of human movement are the muscles and gravity. The muscles and muscular groups, therefore act in synergy, and rarely act alone to produce small or big movement and force movements. They execute fast and vigorous contractions, but after a physical activity period, they need a rest period. They are used to support a position, to increase or to diminish a part of the body, of a segment, to generate great body speed, or in an object in air (HAMILL and KNUTZEN, 1995).

Soft tissues refer to muscles, connective tissues and skin (without contraction). Conjunctive tissues, limits the area of protein structures of the muscle, and contractions structures, composed by fibres, microfilaments and microfibres. The organization of the conjunctive and structures with contractions limit the morphologic condition and the functional capacity of the muscle-skeletal tissues (ANTUNES NETO, 1997).

Muscle has contractive and elastic properties, it shortens when it is stimulated and it relaxes after the contraction, and can be passively elongated. It assumes the shortened position, when immobilized for a certain period of time and loses its flexibility.

Connective tissues around the joints from inside of the muscle also needs to be elongated to increase the amplitude of movement, it is composed initially of a collagen mesh and substantiates matrical. Although the connective tissues do not have contraction properties and relaxation as the muscle, it is slightly flexible. It will elongate slowly with continuous stretching and to slow shortening, if it is immobilized, even being inert and not having contraction.

Procedures for maintenance of the connective tissues mobility are carried through passively; but the muscle can be elongated passively or actively because of its contractual properties.

Skin needs mobility so that the normal movement occurs. Its elasticity allows it to yield to the stretching during active or passive movements of the body.

The nervous system is consists of the sensorial, central and motor systems. The sensorial nerves (sensitive) receive stimuli from areas such as the cutaneous surface (pain, cold, heat) the eyes, nose, ears and tongue. The spinal cord extends from the base of the skull until the second lumbar vertebra, and the brain, forms the central part of the nervous system, that is called the central nervous system (CNS). Here the primary functions consists of integrating the received stimuli, modifying them, executing motor movements, accumulating information (memory) and generating thoughts and ideas. There are connections between CNS and the motor portion of the nervous system, the muscles receive its afferent signals and execute the desired motor event, as, for example, a kick in a soccer game.

A nervous cell destines to receive a message and pass it to other cells. The nervous cells that control the skeletal muscles are called motor neurons. The motor nerve of the muscle is formed by the meeting of many nervous fibres, each one of them proceeding from a nervous cell or neuron. In the interior of the muscle, each nervous fiber separate itself from the others and divide itself in many branches, that can number hundreds.

Therefore, each nervous fiber of the motor nerve of the muscle, in accordance with the number of ramifications, can enervate hundreds of muscular fibres. Thus, when a neuron emits a motor impulse nervous to the muscle through its nervous fiber, all the muscular fibers that had received small nervous branches proceeding from that one, are stimulated and react, contracting themselves.

The information transmitted and relayed for the sensitive and motor nerves is in the form of electric energy called nervous impulse.

The resultant pain of a vigorous exercise after a long period of inactivity or the one that results of the muscular fibre rupture, are examples of sensorial organs in action. There are many types of sensorial organs in the muscles. They are found not only in muscular fibres, but also in the sanguineous vases (arteries) that irrigate the muscular cells and in a conjunctive tissue that surround fibres (MATHEWS and FOX 1983).

Other types of sensorial organs found inside the muscles and the joints are called proreceptors. Its intention is in leading sensorial information to CNS from muscles, tendons, ligaments and joints. These organs relate with the kinaesthetic sense, that says unconsciously where the parts of our body are in relation to our environment. There are three important sensorial muscular organs related with the kinaesthesis: the muscular spindles, the organs with tendons of Golgi (OTG) and the articular receivers.

Souza's study (1997) showed that the basic function of the sensorial receivers is to provide information to the nervous system about the internal condition of the organic structures and the external environment.

The specific purpose of these receivers is to convert energy from diversified natures; in electric impulses, this process is known as transduction. These impulses are sent to the central nervous system to monitor the functioning of some organic systems, between them, the locomotive one.

The mechanism of proreception of the muscular and skeletal system is based on two special types of receivers:

Muscular spindle and Tendon organs of Golgi (OTG).

The elongations are based on the principle of muscular spindles activations and tendon organs of Golgi, that are sensitive to alterations in the length and speed, and the tension of the muscles, respectively. Reflected answers are produced, that make adaptations in the units muscular-tendons, benefiting the amplitude of articulate mobility (SOUZA, 1997).

According to Fox and Mathews (1988), the involved mechanisms of action in the basic receivers of the skeletal muscles are formed by the tendons organ of Golgi (OTG), located at the beginning of the tendons, next to the tendon muscle junction, in series to the muscular spindles, react to the muscular tension during the contraction or muscular stretching, provoking the relaxation of the musculature, causing inhibition of the muscular contraction.

The same authors cite that the static expansion produces greater relaxation, causing bigger distention with little pain, originated of the OTG action, that inhibit the muscles contraction which are connected to the stimulation of the expansion.

When a passive expansion is applied in generated muscle tension, this tension increase can set in motion the OTG and subsequent muscle relaxation, the same will be slack and with bigger length, facilitating its expansion. This process occurs when a muscle is elongated delicately and slowly.

The OTG and the muscular spindles are sensitive to stretching, but they are much less sensitive than the spindles and, being thus, strong stretching is necessary. In contrast with the spindles, that are facilitators (they produce contraction) the stimulation of the OTG result in muscle inhibition where they are located, as a protective function, therefore they induce a relaxation of the muscles, for example during the attempts of a weighed load survey; (this could cause an injury). The two work together, the spindles producing accurately the appropriate degree of muscular tension capable to carry through a uniform movement, and the OTG, effecting muscular relaxation when the weight is harmful for the muscles (FOX AND MATHEWS, 1988).

This mechanism: Muscular tension acts on O.T.G and provokes muscular relaxation.

Stretching increases flexibility. There are requests for increase of distending of the muscle and other structures, kept for determined time. These are supported in the principle of activation of muscular spindles and OTG, sensitive to the alterations in and the tension of the muscles, respectively. The impulses of these receivers provoke reflected answers, that induce adaptations in the muscle-tendon units, that are beneficial for the profit of articulate mobility (SOUZA, 1997).

According to Fox and Mathews (1988) in the ballistic expansion, the abrupt form of muscular request provoked by the dynamic stimulation, activate more muscular spindles, causing contraction of the prolonged muscles, provoking bigger resistance in the distention and also bigger pain during the stimulation. In summary: muscular stretching acts on muscular spindles and provokes miotic reflection. The inter- and intra-staple fibres contract themselves, increasing the muscular tension, elapsing the reduction of the length of the muscle.

When a muscle is stretched, this provokes the stretching of the primary receiver of the muscular spindle, that transmits sensorial impulses to the spinal cord. From the spinal cord, they break impulses through motor-neurons, that contract the muscle that was stretched, opposing to any stretching of the muscle beyond its normal length (SOUZA, 1997).

The muscular spindles are set in motion when a muscle is distended, detecting the muscular stretching, transmitting the information to the central nervous system; then the stretching consequence is given that affects the tension of the muscle when it is prolonged. If a muscle is prolonged quickly, the muscular stretching that acts on the muscular spindle provokes the miotic reflex, making the expansion difficult.

Diverse methods of expansions exist: static, ballistic, passive, active and facilitation neuromuscular proreceptive (FNP), so that an athlete can carry through more advanced expansions than people who objectify health or improve the physical form, foreseeing a lesser risk of injuries.

In one of the precursors of expansions studied, Anderson (1983), we observe that the author emphasizes the static method, as being the correct way to elongate itself, that is, to elongate relaxing in a steady movement, with centered attention to the muscles that are working, going from the sequence of a soft expansion (tension sustained for 20 to 30 seconds) to a gradual (sustained for 30 or more).

About the methods of work with expansion, Dantas (1986) relates 3 types of expansions: Static: it consists in stretching, without shaking, nor forcing, remaining the stretching final position for determined period of time; Dynamic expansion (Ballistic): it is the one which include active movements; Expansion "3 S" (Scientific Stretching for sports): it consists of assuming a position slowly, keeping it for 10 seconds, looking to minimize the consequence of muscular expansion, what reduces to a minimum the injuries. According to Achour Júnior (1995), the methods of static, dynamic flexibility and of neuro-proreceptive facilitation demonstrate considerable increases in reach of the movements.

For this author, the facilitation method neuro-proreceptive, has better therapeutic and athletic intentions compared with the work applied in schools. This shows how much the active method is used in the sporting environment for presenting the same structure of the athletic abilities. Detaches that this method benefits the sanguineous port, hormone adjustments and contractility, contributes in the heating process to increase flexibility, detaches that the active method is cited as inclined the injury for the speed of execution of the movement exceed the extensible, but if the practitioner dominate the technique, does not mean that they will be susceptible to the injury.

In the vision of Achour Júnior (1998), the static method is recommended for children in school, while for the sports the combination of the use of different methods could be dependent on the athletic amplitude and types of muscular contraction.

The exercises of static expansion are interesting, mainly for inexperienced people and to be done in the first series of exercises independent of later executed method. This method has little risk of injuries, utility for being a way of heating, greater easiness to learn the stretching positions.

Referring to the passive expansion, the risk of injuries is increased, if an additional person put more force to win the muscular resistance and if made without previous relaxation can cause little injuries, however its advantage allows to adjust the corporal member in an excellent position to develop flexibility, particularly in extreme amplitude of movements. It is necessary that the people doing the exercise depend on an assistant that knows the techniques of the expansion exercises.

In the vision of the author above cited, about the active expansion it has the possibility of injuries if negligence occurs in the accomplishment of the movements.

However the active expansion is beneficial for the sanguineous port in the exercised region, and must be used in the school environment for the movement possibilities, which therefore plays important role for the specific heating in any athletic performance.

Moraes (1997), in his study about adaptable processes of the muscular skeletal tissue and conjunctive tissue and repercussions about flexibility, raised considerations about expansion techniques used to increase flexibility, discoursing on Passive, Static, Ballistic expansion. The facilitative Neuromuscular Proreceptive (FNP) being the technique that showed itself be more efficient through the studies is the facilitation neuromuscular proreception, which consists of the mobilization of a corporal segment until the limit of its amplitude, after the accomplishment of a isometric contraction principle, forcing the movement

beyond the original limit. It is recommended in the execution phase, so much in the contraction how much the relaxation phase a time of 10 seconds, having to be repeated three times.

The ballistic expansions constitute a risk of damages to the tissues, therefore they consist in the accomplishment of repeated contractions of the agonistic muscles, executed with the objective to get a fast expansion of the antagonistic muscles. They present the risk to unchain injuries because of the speed they are used (ALTER, 1999).

Less intense expansions with long duration, are more recommended, at least once per day, with three or four repetitions each; here are found the biggest values of tension. The time must be between 12 and 18 seconds to obtain the biggest relaxation from stress (LEONI, 1996).

The time in expansion position has not presented uniformity, praises 20 to 30 seconds if carried through the 3 to 5 times per week and if carried through 2 times per week it must be started with 30 seconds and increase to 60 seconds. Other authors suggest 10 to 15 seconds at least 2 times in the same muscular group.

The important theme of this study considers in the programming of the courses of Physical Education, a specific discipline, with safe and complete knowledge, considering Tojal's reflection (1994). This would allow them to develop qualifications and competencies to help the beneficiaries of physical activity.

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BASIC KNOWLEDGE ON MUSCULAR EXPANSION, AND INSERTION OF THE PROFESSIONALS OF PHYSICAL EDUCATION: BIBLIOGRAPHICAL RESEARCH.

ABSTRACT

The significant part of this study is part of a doctorate degree research thesis, which could make possible the entailing of the expansion study with the preparation of professionals in Physical Education; intending to elucidate that contents interest for their formation that allows a deep and safe performance, because the great use of the expansion for the people.

The objective of it is to discourse the neuromuscular function and the mechanism directly involved to the adaptable process front to the stimulations of expansions and immobilization. We verify in the literature that, the muscle has the capacity to modify its form in response to a certain demand, being considered the individual with control to neuromuscular that answers to the necessities of the daily work, being that the soft tissues and joints, are continuously lengthened or shortened and its appropriate fulfillment is kept. When the movement is limited, there occurs shortening of soft tissues. Expansion is destined to get more profits of flexibility, capable of improving the action-reaction conditions, being the daily accomplishment of expansions for 30 minutes is enough to prevent the loss of flexibility and to keep the amplitude of the movement. The drawn out, soft, gradual expansions with a low number of repetitions are considered more efficient than brusque tractions with a great number of repetitions.

As a final consideration, it is understood that it is necessary to offer this knowledge to the professionals of Physical Education, as these professionals are responsible for the physical qualification of the society.

Key-word: muscular expansion, professional formation, stress.

LA CONNAISSANCE DE BASE SUR L'ALLONGEMENT MUSCULAIRE ET L'INSERTION DU PROFESSIONNEL DE L'ÉDUCATION PHYSIQUE: UNE RECHERCHE BIBLIOGRAPHIQUE.

RÉSUMÉ

La partie significative de cette étude, fait partie de la recherche liée à la thèse de doctorat, où l'on a défini un moyen par lequel on pourrait viabiliser le lien entre l'étude de l'allongement et la préparation du professionnel d'éducation physique ; prétendant ainsi découvrir quelles matières seraient d'intérêt à sa formation, lui permettant d'agir de forme approfondie et assurée, en fonction de la grande utilisation des allongements par les personnes. Son objectif revient à discuter la fonction neuromusculaire et le mécanisme proprioceptif, directement impliqués dans le processus adaptatif face aux stimulations de l'allongement et de l'immobilisation. Nous vérifions dans la littérature que le muscle a la capacité de modifier sa forme en réponse à une certaine sollicitation, considérant l'individu ayant un contrôle neuromusculaire, et répond aux besoins du travail quotidien, étant entendu que les tissus mous et les articulations, s'allongent et se raccourcissent continuellement et leur fonction appropriée est maintenue. Le mouvement étant limité, il se produit raccourcissement des tissus mous. Les allongements se

destinent à de plus grands gains en flexibilité, capables d'améliorer les conditions d'action et de réaction, étant donné que la réalisation quotidienne d'allongements durant 30 minutes est suffisante pour éviter la perte de flexibilité et maintenir l'amplitude du mouvement articulaire. Les allongements prolongés, suaves et progressifs avec un bas nombre de répétitions, sont considérés plus efficaces que les tractions brusques et avec un grand nombre de répétitions. En tant que considérations finales, on comprend qu'il est nécessaire d'être enseignée/offerte cette connaissance aux professionnels de l'éducation physique, vu que ces professionnels sont responsables pour la capacitation physique de la société.

Mot-clef: allonge musculaire, formation professionnelle, estresse.

CONOCIMIENTO BÁSICO SOBRE ELONGACIÓN MUSCULAR E INSERCIÓN DEL PROFESIONAL DE EDUCACIÓN FÍSICA: UNA PESQUISA BIBLIOGRÁFICA

RESUMEN

Parte significativa de este estudio, es parte de la pesquisa de la tesis de doctorado, donde se trazó un camino que pudiese viabilizar la vinculación del estudio de elongación con la preparación del profesional de Educación Física; pretendiéndose elucidar qué contenidos interesan para su formación, que permitan su actuación a fondo y de forma segura, debido a la grande utilización de las elongaciones por las personas. Pasa a ser objetivo del presente, discurrir la función neuromuscular y el mecanismo propioceptivo, directamente involucrados en el proceso de adaptación ante los estímulos de elongación e inmovilización. Verificamos en la literatura, que el músculo pose la capacitación de modificar su forma en respuesta a una determinada demanda, considerando que el individuo con control neuromuscular, responde a las necesidades del trabajo diario, siendo que los tejidos blandos y articulaciones, se alargan o se acortan continuamente y su largo apropiado se mantiene. Siendo el movimiento limitado, ocurre acortando los tejidos blandos. Las elongaciones se destinan a mayores ganados de flexibilidad, capaces de mejorar las condiciones de acción y reacción, siendo que la realización diaria de elongaciones por 30 minutos es suficiente para prevenir la pérdida de flexibilidad y mantener la amplitud del movimiento articular. Las elongaciones prolongadas, suaves y progresivas con bajo número de repeticiones, son consideradas más eficaces que las tracciones bruscas y con grande número de repeticiones. Como consideraciones finales, se entiende que es necesario ministrar/ ofrecer ese conocimiento a los profesionales de Educación Física, considerando que dichos profesionales son responsables por la capacitación física de la sociedad.

Palabras llave: elongación muscular, formación profesional, estrés.

CONHECIMENTO BÁSICO SOBRE ALONGAMENTO MUSCULAR E INSERÇÃO DO PROFISSIONAL DE EDUCAÇÃO FÍSICA: UMA PESQUISA BIBLIOGRÁFICA

RESUMO

Parte significativa deste estudo é parte da pesquisa da tese de doutorado, onde traçou-se um caminho que pudesse viabilizar a vinculação do estudo de alongamento com a preparação do profissional de Educação física; pretendendo-se elucidar que conteúdos interessam para sua formação, que permita sua atuação de forma aprofundada e segura, devido a grande utilização dos alongamentos pelas pessoas. Torna-se o objetivo deste, discorrer a função neuromuscular e mecanismo proprioceptivo envolvidos diretamente ao processo adaptativo frente aos estímulos de alongamento e imobilização. Verificamos na literatura que, o músculo possui a capacidade de modificar sua forma em resposta a uma certa demanda, considerando o indivíduo com controle neuromuscular, responde às necessidades do trabalho diário, sendo que os tecidos moles e articulações, alongam-se ou encurtam-se continuamente e o seu cumprimento apropriado é mantido. A movimentação sendo limitada ocorre encurtamento dos tecidos moles. Alongamentos destinam-se a maiores ganhos de flexibilidade, capazes de melhorar as condições de ação e reação, sendo a realização diária de alongamentos por 30 minutos é suficiente para prevenir a perda de flexibilidade e manter a amplitude do movimento articular. Os alongamentos prolongados, suaves e progressivos e com baixo número de repetições, são considerados mais eficazes que as trações bruscas e com grande número de repetições.Como considerações finais, entende-se que é necessário ser ministrado/oferecido esse conhecimento aos profissionais de Educação Física, visto serem estes profissionais responsáveis pela capacitação física da sociedade.

Palavras-chave: alongamento muscular, formação profissional, estresse.