51 - THE INSERTION OF PHYSICAL EDUCATION PROFESSIONALS IN THE PROCESS OF NEUROMOTOR REHABILITATION OF AN INDIVIDUAL

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INTRODUCTION

The guiding factors that have led this work are connected and subsequent, they are: people who have suffered an accident and injured their spinal cord, advances in medicine (studies in mesenchymal, stem cells and the myelin sheath), motor rehabilitation for the people with this type of injury and what contribution is the Physical Education professional offering to the process of motor gain through the neuroplasticity of an individual with cervical medullar injury. From the comprehending that there is an increase of individuals with cord injuries and there is a Physical Education professional in the multidisciplinary team we designed this exploring research, characterized by a qualitative study, having as the research subjects three professionals, being two physiotherapists and a Physical Education professional who have treated a patient with a cervical medullar injury. The patient is a 33-year-old male adult, who lives in Campo Grande, Mato Grosso do Sul, Brazil, and has suffered from a cervical medullar injury, in region C5 since August 2008, who has already been through many types of treatment and with stem cells in Cologne and Dusseldorf, Germany and at the AACD rehabilitation center (Brazilian Association Assistance for Handicapped Children) from São José do Rio Petro, São Paulo, who is currently taking part in a treatment in Sâo Paulo, which has on its study basis to generate and to shape movements.

The subjects are two physiotherapists who are both 30 years old , one has worked in the area for 5 years and the other for 4 years . And a Physical Education who is also 30 years old and who has worked in the area for 12 years. A solicitation of a Home Program course was initially requested for the beginning of the data collection, treating the medullar injured patient at a rehabilitation in the city of São Paulo. After having received the authorization, a course was scheduled in the month of September which lasted three weeks (fifteen days), during this period it was requested to the professionals who were treating the patient's motor development, if they could answer some questions about the process of neuroplasticity that the physical exercises provided to the gain and shaping of the patient's movements. To have theses questions answered a free informed consent form was submitted. The comprehension of the obtained reports through the interviews was punctuated by the motor advancements the subject has obtained since the insertion of the Physical Education professional in the multidisciplinary team in January 2011. Therefore, based in theses comprehensions we can reach our goal of reporting the insertion of the Physical Education professional on the process of neuroplasticity of individuals with cervical medullar injuries.

DEVELOPMENT

Our study is turned towards the sequelae of spinal cord, particularly the cervical region. The medullar injury is classified according to the region it was affected, in the case of an injury in a cervical region, the individual tends to lose the movements under the injured area, in other words, the cervical region is a high point of the spinal cord, therefore, all the movements, both the upper and lower body members would be limited because of the injured area. The cervical region is classified as a high injury thus it is called Tetra, this way indicating that the injury happened in a high point of the cord, however Paresis and Paralisys (plegia) supplements come according to the degree of the injury. Paresis is when the individual has partial loss of motor function, in other words, the stimuli produced by the brain still reach the part of the marrow that has not been broken yet, therefore the patient can have the movements lost in the accident again. Paralisys (plegia) refers to the complete loss of motor function, impeding any type of stimuli produced by the brain reaches the marrow and also impeding the individual to recover any type of movement he/she has lost. (AIRES, 1999; TORTORA, 2010; COOK; WOOLLACOTT, 2003; MAGILL,2011).

The researchers (neuroscientists) began studying the functioning of the nervous system deeper in an attempt to recover the injured medullar area, reestablishing the axonal connections, in other words, providing transmission of stimuli. The more successful attempts were the treatment of the stem cells, with mesenchymal cells and also with the myelin sheath (axonal revetment). (BOLLIGER et all, 2010; KAMINSKI 2010). Currently in the city of São Paulo, there is a research center which began in the Project Walk in California (USA) by a Physical Education professional, Dardzinski. who has the basic principle of improving the motor gains and responses because of the neuroplasticity of movement, which is done by a multidisciplinary team that the Physical Education professional is part of. With the insertion of Physical Education professionals in the health area, we will discuss up to where our contribution along with physiotherapists working to provide better responses in the patient's clinical picture as for the shapes of motor stimuli proving a neuroplasticity of movement can help patient's with cervical medullar injury get motor gain. Trying to comprehend the insertion of Physical Education professionals and their relation with physiotherapists involved in the treatment, we conducted an interview with some questions to be clarified by three professionals, being them two physiotherapists (registered as Physiotherapist A and B who have treated the patient for three years) and a Physical Education professional (who has been inserted in the treatment for 6 months), which have worked with the cervical medullar injured patient.

When asked about the most significant advancements that the cervical medullar injured patient obtained from his/her training process until now, Physiotherapist A approached the subjects of adequacy of spasms, force and a bigger function with shoulder extension in the upper members. Whereas Physiotherapist B alongside the Physical Education professional discussed the improvement of the control and stabilization of the torso in the posture. However, Physiotherapists A and B and the Physical Education professional agreed on the argument that the patient had an improvement in the activities of the lower members muscles and the increase of the muscular force of the upper members. In the beginning the spasm is forced through a tactile stimulus, as the usage of pinches, ice and electrical currents. However, if the stimulus is modulated incorrectly, when the person recovers his/her movements (due to the treatment with cell that change and perform the role of cells that were injured and through physical exercises stimulated via sensory), when the person makes a specific gesture, which was badly modulated, the person can feel pain, cold or shock when making this specific gesture, because the brain will relate the performed movement to the stimulus which had been modulated. (BOLLINGER et all, 2010; KAMINSKI, 2010; COOK; WOOLLACOTT,2003; MAGILL, 2011).

Physiotherapist B and the Physical Education professional approached some points of how the protocol used for the patient. Both said that the daily training lasts three hours and the hours are divided in: activation of the lower members, upper members and abdomen. After this activation , fundamental postures for the human development are performed, among theses

postures strengthening exercises are performed so the motor learning can take place. Even with all this advances in the neuroscience, a person who loses his/her body movements caused from an injury, needs to relearn how to learn new ways of performing the same movements performed before the injury (Motor Learning). The process of relearning in a different way is called neuromuscular modulation or simply neuroplasticity. This neuroplasticity must be performed very carefully, because the motor gain will take place due to the injured person's spasms control (involuntary muscular contractions) (MAGILL, 2011; COOK; WOOLLACOTT, 2003; SCHIMIDT; WRISBERG, 2001).

When questioned if the utilized exercises promoted a possible neuroplasticity, the three professionals were emphatic and said yes, the neuroplasticity takes place.

" Nowadays the scientific studies in the area point that the therapies based on activities as a way of stimulating the neuroplasticity. The bigger the level of activity and stimulus on the CNS, the bigger the changes of keeping it active and provide a recover. Thereby, as in the disuse, in other words, the lack of stimulus under the injury can delay or inhibit the recover." (Physiotherapist A)

" The exercises work as an guide and stimulate the neuroplasticity. The repetition and the intensity of the exercises lead to the motor learning." (Physiotherapist B).

"When an afferent stimulus is sent through the proposed exercise, the client is asked to think in performing this movement by also sending a stimulus. With theses stimuli it is believed that a neural increase can occur, thus forming new connections. However, it is not possible to know how long these new connections take to be formed yet. That is why the consistency of the training is essential for the motor reorganization." (Physical Education professional)

Our body is totally connected by nerve endings, which carry brain electrical impulses back and forth to the our body peripheral nerve endings. Therefore, we human beings possess five senses, which are: sight, hearing, taste, touch and smell. Nowadays, we can count on the scientific advancements (stem cell, mesenchymal, among others) which can increase the chances of motor gain for a cervical medullar injured person. These treatments, such as stem cells, makes the injured area, in this case the marrow, regenerate itself and the nerve axons regenerate themselves. (COOK; WOOLLACOTT, 2003; MARGILL, 2011; BOLLIGER et all, 2010). Therefore, the passage of nervous signals sent by the brain manages to reach the muscle. According to Kaminski (2010), it is not known yet what is the best route of administration of this technology and up to which point the gains are bigger the losses. What is known so far is that it actually bridges the passage of nervous stimuli. It can seem outrageous, but according to Bolliger et all, (2010) the use of human senses can generate and modulate stimuli. As the movement is a muscle response to an electrical stimulus, if the person is not able of provoking this stimulus in the normal course (neuron-axon and ramifications), the stimulus can be incited, in other words, forced by a type of sense. If we analyze a person with a cervical medullar injury, and thus person is not able to perform a specific movement spontaneously, the profession who is in charge of the treatment in his/her series of exercises can perform a tactile stimulus so the muscle or the member in question can be worked on. The part of motor learning is essential to make the person resume the movements she/he once had possible. And when the movements are back, aim the increase of level of their performance. This performance is connected to the repetition of a gesture with the aim of polishing it, leaving it more effective. However, according to Schimidt an Wrisberg, (2001) to this motor learning and movement performance occur, our body has to modify itself internally, so later on it can produce a motor task, in other words, our brain has to send nervous stimulus to the muscles, so the desired movement can be generated through contraction . In the same train of thought, trying to understand how the process of learning and motor control in the exercises happened, three professionals were question about how theses processes would be:

"The experiences in posture that differ from the ones in a wheelchair, as well as the stimuli and disabilities in the segments under the injury activate the spinal circuits and stimulate the courses which have not been completely injured to recover the connection with the supraspinal and thus contribute to the process of learning or relearning the movements." (Physiotherapist A).

"Through the repetition and intensity of the exercises performed always inside the alIgnement, avoiding compensations." (Physiotherapist B).

"As the client does not always remember how to perform a specific movement, initially we explain what movement will be performed, which are the involved muscles in the performance and lastly we perform a movement so the client can visualize and understand what is necessary to think before performing the movement." (Physical Education professional)

According to Schimidt and Wrisberg, (2001) the motor learning happens from the inside out, in other words, inner changes that the determine the individual's capacity are necessary to produce a motor task. A clear example of this learning is noted in children who are learning to walk. A child internal factors make him/her try an autonomy to be able to move freely, thus he/she will try to be in a biped position and will give the first steps towards something that motivates them. This inner change in our body is called motor control. Cook and Woollacott (2003) believe the motor control is the capacity of regulating the essential mechanisms for the movement. In other words, the remote control is based on our body to develop its function, through the neuromuscular control, it is what controls coordinates the evolved muscles and members in a task of motor skill. Magill (2011) approaches the fact of researchers being able to investigate this question of motor control while a person is learning a new skill or performing a well learned or well practiced skill.

Currently, this investigation is more frequent when the subject of motor control is related to new discoveries of the neuroscience. Some of these examples are present in the studies with insertion of Mesenchymal stem cells straight in the injured area. (BOLLIGER et all, 2010). Vaquero (2010) approaches this thematic treatment, which found positive results in the test, proving that with the applications of this cells on the injured areas increased significantly the passage of nerve stimuli, in other words, an area that by the injury should be inert and without function, starting to show improvement signs. Of course, these are studies and we cannot count on this new technology to cure certain trauma related to the marrow yet. However, even the minimum advancements can provoke huge changes for the motor gain of theses patients, since the impulses are generated and transmitted, the movement will occur naturally.

Since the research is performed with a person who has injured the marrow in the cervical area, it is necessary to know which cares the profession should take. Therefore, the three professionals were asked about how they should act. The physiotherapists share the same idea, which would be: during the activities all the cares with the positioning, alignment and safety must be taken. Besides, the proper care with the alterations related to the autosomal nervous system as autosomal dysreflexia, postural hypertension, hyperthermia, ossification, postural hypotension and possible impairment secondary to the injury, as muscle shortening, DVT, etc. The Physical Education professional added that the professionals should always be attentive to the resonance exam, bone densitometry exam, x-ray, etc. Besides having medical release to the training. We can understand from this study that the physical education professional could have more knowledge about his/her area of expertise by breaking toughened paradigms, since the physical education professional contributes significantly to the process of neuroplasticity in individuals with cervical medullar injury, equating the knowledge and service performed with the other professionals.

According to the rule: CREF11/MS-MT number 085/2010 Chapter II from the area and the professional activity of the Physical Education professional is also related to the rehabilitation (www.cref11.org.br/estatuto.asp). We understand in this study that there is much information related to the motor control learning of individuals with cervical medullar injury to be studied and analyzed, as well as the discussion about the processes which evolve the neuroplasticity, making a new opportunity to bring the account of the individual with cervical medullar injury possible, more specifically about his/her perception about the relation of the Physical Education professional with the individual. Concluding, it is relevant to mention that the guiding of the Physical Education professional with motor stimulation exercises that evolves the neuroplasticity in this individual with medullar injury is done daily, constantly and exhaustively, in other words, it is a training administered by a skilled professional who has graduated in a course in the area, which evolves study, training, sighting and reflection related to the procedure that was provided by other professionals a few years ago.

CONCLUSION

The insertion of the Physical Education professional in the process of neuroplasticity of an individual with cervical medullar injury can be effective and efficient whereas the Physical Education professional has knowledge of motor learning, motor control, physiology, neurophysiology, neuroscience, which are general education so the professional can contribute in a effective and positive way to the process of neuroplasticity, besides trying to update his/her knowledge in theoretical and practical terms, having courses and training about exercises that promote the neuroplasticity in medullar injured patients. The study showed that the Physical Education professional can and must perform all the procedures in the process of neuroplasticity in individuals with medullar injury, as well as participating of the theoretical and practical training offered by the institutes who have brought this training methodology of treatment / training from the United States of America to Brazil.

This study did not have the interest in showing the best technique (methodology) of physical, motor, perceptive and sensitive exercises for individuals with medullar injury, only the insertion of Physical Education professionals in a certain field of work. From this, we can see the necessity of mentioning that we did not have in any moment the pretension of advertise the neuroplasticity as the best procedure for motor gains in individuals with medullar injury, but as another procedure the Physical Education professional can perform. However, we are not convinced of which is the best procedure related to the motor stimulation, which is the most efficient, because from the study, more specifically from the 15 days spent monitoring the individual in São Paulo, we comprehended there is an communion of factors that can be related to the neuromuscular gain in individuals with medullar injury. We understand that the neuromuscular system is totally integrated, depending on its totality of different ways of generating and modulating stimuli so the same body starts producing both the same as different types of movements. Finally, we comprehend that the neuroplasticity is a very interesting, fascinating and challenging field of work, because the studies are very recent, innovative and that the nervous system is mysterious, making more studies more and more necessary. In order to know how to best proceed and what is the level and degree of its efficiency for the motor gain. However, we can assure it is a field of work that does not leave anything to be desired to any other healthcare professional.

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THE INSERTION OF PHYSICAL EDUCATION PROFESSIONALS IN THE PROCESS OF NEUROMOTOR REHABILITATION OF AN INDIVIDUAL

ABSTRACT

The guiding factors that have led this work are connected and subsequent, they are: people who have suffered an accident and had their spinal cord injured, specifically the cervical part, advances in medicine, motor rehabilitation and the possible roles of a Physical Education on the process of neuroplasticity. This study aims to describe the insertion of physical education professional in the process of neuroplasticity of an individual who suffers from a cervical cord injury. For this purpose the research is of the descriptive type characterized as a study case. The subjects are three professionals, among them two physiotherapists and a Physical Education professional, who were enquired with questions related to the neuroplasticity process. The result of the study showed that the insertion of a physical education professional in the neuroplasticity process of an individual with cervical medullar injury is significant because the stimuli modulation is at the same level as the one done by the physiotherapists, it was understood from the three subject's reports that the Physical Education professional contributes to one's motor gain alongside the medullar injury. We consider that the insertion of a physical education professional is effective in this individual's multidisciplinary team. Therefore, we conclude that neuroplasticity is a study area and of Physical Education professionals' interest, however more studies in the area are necessary to know and to practice this process in our application on individuals with medullar injury.

KEYWORDS: motor learning, motor control, neuroplasticity - medullar injury.

INTÉGRATION DE FORMATION PROFESSIONNELLE EN PHYSIQUE PROCESSUS DE RÉADAPTATION NEUROMOTRICE UN GARS AVEC LÉSION MÉDULLAIRE

RÉSUMÉ

Les facteurs déterminants qui ont fait ce travail se posent sont liés et ultérieures étant : les gens qui ont subi des accidents et ont endommagé la moelle épinière dans une partie spécifique du cou , les progrès de la médecine , la rééducation motrice et les possibilités d'interprétations de professionnels de l'éducation physique dans le processus de neuroplasticité . Le

but de cette étude est de rapporter l'inclusion de l'éducation physique dans le processus de neuroplasticité d'un patient dont la lésion de la moelle épinière cervicale . Pour la plupart des recherches est descriptive caractérisé comme une étude de cas . Les sujets sont trois professionnels, dont deux physiothérapeutes et un professionnel de l'éducation physique , qui ont été exposés à des questions sur le processus de neuroplasticité . Le résultat de l'étude montre que l'inclusion de l'éducation physique dans le processus de neuroplasticité d'un patient dont la lésion de la moelle épinière cervicale est important parce que la modulation de stimuli est au même niveau que les physiothérapeutes , réalisé par les rapports des trois sujets que professionnel l'éducation physique contribue à contribuer aux gains de chacun des moteurs ayant une lésion de la moelle épinière . Nous considérons l'inclusion de professionnels de l'éducation physique est efficace dans l'équipe multidisciplinaire cet individu avec des blessures de la moelle épinière . Ainsi , nous concluons que la neuroplasticité est un domaine d'étude et d'intérêt pour les professionnels de l'éducation physique , mais plus de recherches sont nécessaires pour comprendre et appliquer ce processus dans notre domaine avec des personnes atteintes d'une lésion de la moelle épinière .

MOTS-CLÉS: l'apprentissage moteur; commande du moteur; neuroplasticité - blessures de la moelle épinière .

INSERCIÓN DEL PROFESIONAL DE EDUCACIÓN FÍSICA EN EL PROCESO DE REHABILITACIÓN NEUROMOTORA DE UN INDIVIDUO CON LESIÓN MEDULAR

RESUMEN

Los factores rectores que han hecho de este trabajo vienen están interrelacionados y posterior, que son: personas que han sufrido accidentes y han dañado la médula espinal, en una parte específica de la cervical, los avances en la medicina, rehabilitación motora y las posibilidades de acción del profesional de Educación Física en el proceso de la neuroplasticidad. El objetivo de este estudio es informar la inserción de professional de educación física el proceso de la neuroplasticidade de una persona con lesión de la médula espinal cervical. Por tanto la investigación es un estudio descriptivo caracterizado como un estudio de caso. Los sujetos son tres profesionales incluidos dos fisioterapeutas y un profesional de la Educación Física, que fueron cuestionados con preguntas sobre el proceso de neuroplasticidade. El resultado del estudio muestra que la inserción del profesional de Educación Física el proceso de la neuroplasticidad de una persona con lesión de la médula espinal cervical es significativo debido a que la modulación de estímulo es en el mismo nivel que los fisioterapeutas, percibirnos por los informes de los tres indivíduos que profesional de Educación Física favorece la contribución a los motores de ganancias la persona con lesión de la médula espinal. Considerar que la inserción del profesional de educación física es eficaz en el equipo multidisciplinario de este individuo con lesión de la médula espinal. Por lo tanto, llegamos a la conclusión de que la neuroplasticidad es un área de estudio y el interés de los profesionales de Educación Física, sin embargo se necesitan más estudios para conocer y aplicar este proceso en nuestra área de operación con las personas con lesión de la médula espinal.

PALABRAS CLAVE: aprendizaje motor; control motor; neuroplasticidad - lesión de la médula espinal.

INSERÇÃO DO PROFISSIONAL DE EDUCAÇÃO FÍSICA NO PROCESSO DE REABILITAÇÃO NEUROMOTORA DE UM INDIVÍDUO COM LESÃO MEDULAR

RESUMO

Os fatores norteadores que fizeram surgir este trabalho se encontram interligados e subsequentes, sendo eles: pessoas que sofreram acidentes e lesaram a medula espinhal, em especifico a parte da cervical, avanços na medicina, reabilitação motora e as possibilidades de atuação do Profissional de Educação Física no processo da neuroplasticidade. O objetivo deste estudo é relatar a inserção do profissional de educação física no processo de neuroplasticidade de um indivíduo com lesão medular cervical. Para tanto a pesquisa é do tipo descritiva caracterizada como um estudo de caso. Os sujeitos são três profissionais entre eles dois fisioterapeutas e um profissional de Educação Física, os quais foram questionados com indagações a respeito do processo da neuroplasticidade. O resultado do estudo nos mostrou que a inserção do profissional de educação física no processo de neuroplasticidade de um indivíduo com lesão medular cervical é significativo pois a modulação de estímulos é no mesmo nível que os fisioterapeutas, percebemos pelos relatos dos três sujeitos que o profissional de Educação Física favorece na contribuição para os ganhos motores do individuo com lesão medular. Consideramos que a inserção do profissional de Educação Física é efetiva na equipe multidisciplinar deste individuo com lesão medular. Assim, concluímos que neuroplasticidade é uma área de estudo e de interesse dos profissionais de Educação Física, no entanto se faz necessário mais estudos para conhecer e aplicar este processo na nossa área de atuação com indivíduos com lesão medular.

PALAVRAS-CHAVE: aprendizagem motora; controle motor; neuroplasticidade – lesão medular.