28 - ANALYSIS OF FORCE IN TRUNK OF MUSCLE PORTADORES OF INJURY MEDULAR.

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Introduction

It is understood by spinal cord injury the damage to a complex neural network involved in the transmission, modification and sensory and motor coordination, and control systems for autonomous bodies. In fact the dysfunction of post-traumatic spinal cord causes the loss of homeostatic and adjustment mechanisms that keep people healthy naturally (STOKES, 2000).

The hydrotherapy used to treat the injured spinal cord, is requested to have a character where the techniques are directly and indirectly related to the trunk, extending by the upper and lower limbs, obtaining an increase in muscle strength of members and is crucial to better quality of life of the patient.

The neurofuncionnal conventional therapy has a character that aims at quality of life of the patient, or is directly related to the same functionality, where the patient is seen as a whole, and not as a segment or a particular problem.

In any of the procedures used in rehabilitation neurofuncionnal, where techniques are worked to provide improvement in muscle strength, increased range of motion and all possible physical responses to the patient. In response to a given stimulus, such techniques are applied with only one aim, to return the highest level of independence of the patient but had to be full cooperation of the same improving their skills in their routine activities of daily life.

According to Campion (2000), the therapeutic effects in the water are related to: relieve pain and muscle spasms, maintaining or increasing the range of motion of joints, strengthening of weakened muscles and increase its tolerance to exercise, rehabilitation of muscles paralysed , Improvement of movement, encouragement of functional activities, maintenance and improvement of balance, coordination and posture.

The benefits found in the literature on the training of athletes with spinal cord injury are: improvement of consume oxygen (VO2máx.), gain in aerobic capacity, reducing the risk of cardiovascular disease and respiratory infections, increase in life expectancy, raising the levels of comunity integration, aid in fighting the disability, fostering independence, improved self-image, self-esteem and satisfaction with life and decrease the likelihood of psychological distress (SILVA, LIVEIRA and CONCEIÇÃO, 2005).

Paeslack (1978), apud Almeida e Tonello (2007), considers the hydrotherapy beneficial for paraplegics in the following respects: recovery and improvement of physiological functions affected by the injury, training of the muscles of the trunk, waist and arms scapular; training coordination; assistance in training the balance in upright position or sitting; training of the muscles which was partially injured, in the case of paresis; incentive to improve performance physical confrontations in sports.

The hydrotherapy also has a great therapeutic value to individuals with spinal cord injury with regard to reduction of spasticity by the swimming pool heated; reduction of contractures through heated water. With regard to injuries incomplete, the author puts these patients have sparse weakened muscles and sensation of discrete areas and can get strength and coordination through the styles of swimming (ALMEIDA e TONELLO, 2007).

In a broad view of rehabilitation neurofincionnal, seeks to provide a way to increase the chances of functional result from the same spectrum of capabilities, emphasizing working with control points, goals and objectives of short, medium and long term, within a multi-professional system. Aiming to improve the quality and quantity of moves made in accordance with the existing functional need, thus promoting the empowerment of character movements in functional usable in daily tasks. (JOPPERT, 2007)

The neurofuncional conventional therapy has a character that aims at quality of life of the patient, or is directly related to the same functionality, where the patient is seen as a whole, and not as a segment or a specific issue.

The dinamômetry refers to all kinds of procedures aimed at measuring the forces and, measuring the distribution of pressure (ADRIAN AND COOPER, 1995, apud Santos 2002).

The dynamometry is a type of equipment that measures the performance of the load or voltage extended by deformation of a spring, displacement of air, or extension of metal alloys, which include to determine the coefficient of friction between materials (Santos, 2002).

The dinamômetry of trunk is used in medical examinations, functional tests, selection of personnel in enterprises, military examinations, schools, clubs, gyms, evaluation of physical development, evaluation of motor recovery, being applied to individuals in normal state of health, in the process rehabilitation, or sports training. (Santos, 2002).

This work is justified in attempting to measure and quantify answers related to muscle strength of trunk after physiotherapeutic treatment of different approaches, contributing to new forms of intervention in neurofuncionaly physiotherapy.

Materials and methods

This study was conducted with two male patients, aged between 28 and 40 years with clinical diagnosis of spinal cord injury at chest level and physiotherapeutic diagnosis of spastic paraplegia incomplete, with time of injury more than five years. The patients were submitted to an evaluation on the first day and after 12 meetings for treatment, subjected to a reassessment, based on the same principles of the evaluative process. This procedure was performed by measuring the muscle strength of trunk held with the dynamometer Crow, made in two stages: first, the patient pulling by three times the leverage of equipment at intervals of thirty seconds and the second stage, on three occasions pulling and maintaining the lever suspended by four seconds, after each stage and returned rested thirty seconds.

The two patients were referred for physiotherapy neurofuncionnal sector, which received twelve attendances in neurofuncionnal conventional physical therapy, the academic sector. The protocol for treatment of the patient 1, and is seen in the sector of physiotherapy neurofuncionnal, had as additional treatment in the hydrotherapy sector, with selected technical protocol of the method of the Rings, Bad Ragaz twelve patients receiving this method. The patient 2, had its protocol based on the method of Neuromuscular Facilitation Proprioceptive (FNP).

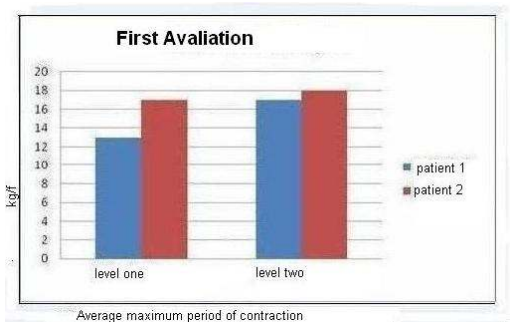
The consultations were conducted three times a week (Monday, Wednesday and Friday) at a time of 11:50 hours to 11:00 hours, with durability of 50 minutes each service, the total number of 12 attendants.

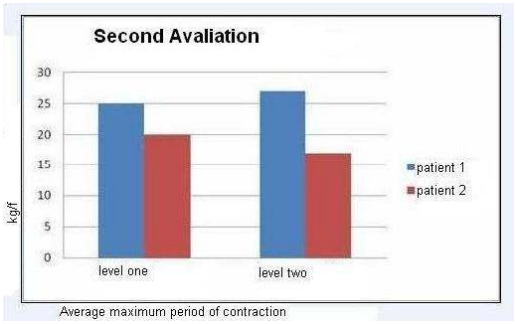
The equipment used during the treatment neurofuncional were tatame, orthostatic board and electrical divam. In

dealing hydrotherapeutic was the pool, which maintained a temperature of 33 ° C, showing the size of ten meters in length and, six meters wide. The pool has a depth of one meter and twenty centimeters in the less profound and one meter and eighty centimeters at the deepest. For the better positioning of the patient, during the course of handling inside the pool, were used collect a cervical, a espaguete and a pelvic belt.

Results and Discussion

The results were achieved through the Excel charts, with data base simple porcentage.





The analysis of results was conducted by an average of steps taken in the assessment and reassessment of patients 1 and 2. There was a significant improvement in 56.7% as it relates to the patient 1, which received the additional treatment of hydrotherapy.

Campion (2000) reports that the therapeutic effects in the water are related to: relief of pain and muscle spasms, maintaining or increasing the range of motion of joints, strengthening of weakened muscles and increase its tolerance to exercise, rehabilitation of paralyzed muscles, improving the movement, encouragement of functional activities, maintenance and improvement of balance, coordination and posture.

It is clear that the positive effects provided by hydrotherapy are many more where concerns, the muscular rehabilitation, including strengthening, stretching and modulation of tone. How to inform the results of this work, where there were positive developments in the trunk of muscle strength in patients with spinal cord injury.

These results agree with the statements de Almeida (2007), which considers the hydrotherapy beneficial to the injured spinal cord in the following respects: recovery and improvement of physiological functions affected by the injury, training of the muscles of the trunk, waist and arms scapular , Coordination of training, assistance in training the balance in upright position or seated, training of the muscles which was partially injured, in the case of paresis, incentive to improve performance physical confrontations in sports.

For the additional protocol applied in liquid medium, used from the knowledge of the principles of physical water and method of the Rings, Bad Ragaz (MABR), with selection of techniques directly and indirectly related to the trunk.

This method is a technique that comes from physical therapy neurofuncionnal, based in the method of FNP thus incorporated in the net, It utilizes the diagonals of FNP, where his main goals that justify the application of the method relating to the reduction of muscle tone , Relaxation, increased scale articulate, reeducation muscle, muscle strengthening, restoration of normal patterns of movement, and improves the overall resistance (RUOTI, Morris, Cole, 2000).

In this method, the therapist provides stability for the patient and the position of influence in moving his hands and the patient in the amount of work and isometric isotonic done. Can be achieve the irradiation of muscles stronger for those who are weakest (SKINNER and THOMSON, 2000, apud, BRIGANTE, 2000).

Being clear on this method, is an integration stimulus - response, the therapist for the patient, where the verbal stimuli and the hand controls that address the progress of standards, to be precise, developing the necessary responses to have a visible trend. Since rolling was the result of this work of practical character, able to prove the effectiveness, seen only in literature.

The training of resistance appears to be the most effective method for the development of muscular strength and has been prescribed by many health organizations to improve health and physical fitness (ACSM, 2002). It is important to emphasize that all of the technical protocol based on the method of the Rings, Bad Ragaz, established in this study were carried out with the resistance's manual therapist, to contribute to gains in muscle strength.

The response of the patient 2, has remained on average expected, where the first stage of review, the results rose from 48.6% to 54% of the average second has remained equal to the assessment, the protocol used for this patient held high positions in the ground directing, following the orthostatic, necessary for the improvement of visceral functions and venous return, checked in orthostatic board.

This posture is necessary for preventing the injured spinal cord deformities and possible pressure ulcers, which remain most of the time in the same decubitus (seated), when adopting this posture, the structure squeleticmuscle adjustments occur proprioceptives, ordering a new experience just experienced, being directed stimuli automatic trunk, to which they can maintain stability without collapse.

It was also used as treatment for Neuromuscular Facilitation Proprioceptive (FNP), which are directed diagonals with the goal of improving the functionality and muscle rehabilitation of the patient, being used in two ways directly or indirectly, radiating positive results for the trunk, when not directed to the same.

Goldenberg concording with(2005), the FNP is a method widely used in the treatment of diseases of the spine directly involved in the trunk and promote the improvement of strength, coordination and balance. Thus through the work of stabilizing the trunk, with better postural alignment and harmonization of curvature of the spine, you get a better energy and labour income resulting muscular performance "great" for carrying out activities of daily life and recreational.

Also, Shumway-Cook and Woollacott (2003), affirm that the recovery of functional independence after a neurological problem is a complex process, requiring the reconquest of many functional capabilities, where the control of the trunk is the essential part of recovery of function . With the significant increase that has obtained in this study, the magnitude of active muscle strength, it can be said that the control of the trunk of the sample improved considerably.

Moreover Adler et. al. (1999) reinforces that when a muscle contraction is resisted, is increasing the response of muscle stimulation to the cortex. The active muscle tension, caused by the resistance is the facilitation proprioceptive more effective. The reflexes proprioceptives of muscle contraction and increase responses from the same synergistic muscles and

articulation of the joints associated synergistic close. The facilitation can spread is proximal to distal and proximal to distal.

The gains in strength and increase the amplitude of movement obtained in this study may also be related to contact the patient's manual therapist. According Reichel (1998), the contact manual applied in its ability to increase muscle contraction. Putting pressure on the opposition direction of the movement, anywhere in the State, stimulate the muscles synergistic, thus enhancing contraction. (Reichel, 1998)

Conclusion

From the responses obtained in this study, we observed that the relationship of therapies offered, together contribute effectively in the treatment of the injured spinal cord. As well as the redemption of strength of trunk. It is suggested further studies with more patients and longer treatment for a more expressive quantify the gains related to muscle strength of trunk in patients with spinal cord injury.

References

ACSM American College of Sports Medicine. **Modelo de progressão no treinamento de resistência,** 2002. Disponível em: http://www.cdof.com.br/acsm5.htm. Acesso em: 7 jun. 2008.

ADLER, S.S. *et. al.* **PNF: Facilitação Neuromuscular Proprioceptiva:** um guia ilustrado. Método Kabat. São Paulo: Manole, 1999.

ALMEIDA, P. A.; TONELLO M. G. M. **Benefícios da natação para alunos comlesãomedular.**BuenosAires,marçode2007,disponívelem:**http://www.efdeportes.com/efd106/beneficios-da-natacao-para-alunos-com-lesao-medular.htm**
acesso em: 01 de abr. de 2008.

BRIGANTE, P.; **Os efeitos do Método Bad Ragaz em piscina terapêutica na paraparesia espástica de um paciente adulto portador do vírus HTLVI.** Disponível em: http://www.fisionet.com.br/monografias/interna.asp?cod=5 acesso em: 01 de abr. de 2008.

CAMPION, M.R. **Hidroterapia**: princípios e prática. São Paulo: Manole, 2000.

GOLDENBERG, J. **Facilitação Neuromuscular Proprioceptiva:** Método Kabat. Portal da coluna, 2004. Disponívelem:http://www.portaldacoluna.com.br/conteudo.asp?IdMenu=12eIdSubMenu=57 Acesso em: 1 abri. 2008.

JOPPERT, D.; **Competências essenciais na reabilitação neurofuncional com foco no desenvolvimento integral para melhores desempenhos funcionais.** Disponível em: http://www.wgate.com.br/conteudo/medicinaesaude/fisioterapia/neuro/neurofuncional_joppert.htm acesso em: 01 de mai. de 2008.

REICHEL, H. S. **Facilitação Neuromuscular Proprioceptiva:** Método Kabat. São Paulo: Premier,1998.

RUOTI,R.G.; MORRIS, D.M.; COLE, A.J. **Reabilitação aquática**. São Paulo: Manole, 2000.

SANTOS, L. J. M.; **Dinamometria Isocinética Lombar.** Disponível em: http://www.efdeportes.com/efd49/dinam.htm acesso em: 04 de mai. de 2008.

SILVA, M.C.R.; OLIVEIRA, R.J.; CONCEIÇÃO, M.I.G. Efeitos da natação sobre a independência funcional de pacientes com lesão medular. **Sociedade Brasileira de Medicina do Esporte**. Brasília, DF. N°4, p.251-256, jul/ago, 2005.

STOKES, M. **Neurologia para fisioterapeutas**. São Paulo: Premier, 2000.

SHUMWAY-COOK A.; WOOLLACOTT, M. H. **Controle Motor:** Teorias aplicadas práticas. São Paulo: Manole, 2003.

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ANALYSIS OF FORCE IN TRUNK OF MUSCLE PORTADORES OF INJURY MEDULAR.

Summary:

The treatment done out in pool therapy, provides many positive effects. Specifically individuals with spinal cord injury in the hydrotherapy has great therapeutic value as regards the reduction of spasticity and contractures through heated water. In addition to reducing the pain and muscle spasms, maintain or increase the range of motion, muscle rehabilitation, stretching and muscle strengthening, encouragement of functional activities, maintenance and improvement of balance, coordination and posture, respiratory infections, increase in life expectancy, increased levels of integration, aid in fighting the disability, fostering independence, improved self-image, self-esteem and satisfaction with life, among others. This study aimed to measure and quantify answers related to muscle strength of trunk after physiotherapeutic treatment of different approaches, contributing to new forms of intervention in physiotherapy neurofuncionnal. Part of this research two male patients diagnosed with spinal cord injury at chest level, the ages of 28 and 40 years. Assessment was used as the measurement of muscle strength of the trunk dynamometer Crown, and made an assessment at the beginning and one at the end of treatment, totaling 12 attendants. One patient received treatment hydrotherapeutic associated with therapy and other neurofuncionnal only therapy neurofuncionnal. The results were achieved through graphs with the Excel database, and simple percentage. From the results, there was a positive response in the two treatments, but it was felt best results when related to the treatment hydrotherapy.

Key words: muscular strength of the trunk, spinal cord injury, hydrotherapy.

ANALYSE DE LA FORCE DANS LE TRONC DU MUSCLE PORTADORÉHS DE BLESSURES MEDULAR.

Résumé:

Le traitement fait par la thérapie dans la piscine, offre de nombreux effets positifs. En particulier les individus avec lésion de la moelle épinière dans l'hydrothérapie a une grande valeur thérapeutique en ce qui concerne la réduction de la spasticité et les contractures chauffée par l'eau. En plus de réduire la douleur et des spasmes musculaires, de maintenir ou d'augmenter la portée du mouvement, des muscles de relèvement, de stretching et renforcement musculaire, l'encouragement des activités fonctionnelles, l'entretien et l'amélioration de l'équilibre, la coordination et la posture, les infections respiratoires, augmentation de l'espérance de vie, l'augmentation les niveaux d'intégration, l'aide dans la lutte contre le handicap, la promotion de l'indépendance, l'amélioration de l'image de soi, l'estime de soi et la satisfaction avec la vie, entre autres. Cette étude visait à mesurer et quantifier les réponses liées à la force musculaire du tronc après un traitement de physiothérapie des approches différentes, en contribuant à de nouvelles formes d'intervention en physiothérapie neurofuncionnal. Une partie de cette recherche deux patients de sexe masculin diagnostic de lésion de la moelle épinière au niveau de la poitrine, l'âge de 28 et 40

ans. Évaluation a été utilisée comme mesure de la force musculaire du tronc dynamomètre Couronne, et a procédé à une évaluation au début et un à la fin du traitement, pour un total de 12 participants. Un patient a reçu un traitement hydrothérapique associés à la thérapie et d'autres neurofuncionnal seulement neurofuncionnal thérapie. Les résultats ont été obtenus par des graphiques Excel avec la base de données, et simple pourcentage. D'après les résultats, il ya eu une réponse positive dans les deux traitements, mais il a estimé meilleurs résultats lorsqu'elles se rapportent autraitementd'hydrothérapie.

Mots-clés: la force musculaire du tronc, lésion de la moelle épinière, hydrothérapie.

ANÁLISIS DE LA FUERZA EN LOS MÚSCULOS DEL TRONCO PORTADORES DE LESIÓN MEDULAR.

Resumen:

El tratamiento llevado en piscina de terapia, proporciona muchos efectos positivos. Especificadamiente las personas con lesión medular en la hidroterapia tienen un gran valor terapéutico en lo que respecta a la reducción de la espasticidad y las contracturas por la agua calentada. Además de reducir el dolor y los espasmos musculares, mantener o aumentar la amplitud de movimiento, la rehabilitación muscular, estiramiento y fortalecimiento muscular, el aliento de las actividades funcionales, el mantenimiento y la mejora del equilibrio, la coordinación y la postura, las infecciones respiratorias, aumento de la esperanza de vida, el aumento de niveles de integración, ayuda en la lucha contra la discapacidad, el favor de la independencia, una mejor imagen de sí mismo, autoestima y satisfacción con la vida, entre otros. Este estudio tuvo como objetivo medir y cuantificar las respuestas relacionadas con la fuerza muscular del tronco después de tratamientos fisioterapéuticos de los diferentes enfoques, lo que contribuye a nuevas formas de intervención en fisioterapia neurofuncional. Parte de esta investigación dos pacientes varones con diagnóstico de lesión de la médula espinal a nivel del pecho, las edades de 28 y 40 años. La evaluación se utilizó como la medición de la fuerza muscular del tronco dinamómetro marca Corona, y realizó una evaluación al comienzo y uno al final del tratamiento, con un total de 12 asistentes. Un paciente recibió tratamiento hidroterapeutico asociado con la terapia neurofuncional y otros sólo terapia neurofuncionnal. Los resultados se lograron a través de gráficos con la base de datos Excel, simple y porcentaje. A partir de los resultados, hubo una respuesta positiva en los dos tratamientos, pero se consideró obtener los mejores resultados cuando se refieren al tratamiento de hidroterapia.

Palabras-llaves: fuerza muscular del tronco, lesiones de la medula espinal, hidroterapia.

ANÁLISE DA FORÇA MUSCULAR DE TRONCO EM PORTADORES DE LESÃO MEDULAR.

Resumo:

O tratamento realizado em piscina terapêutica, proporciona inúmeros efeitos positivos. Especificamente nos portadores de lesão medular a hidroterapia tem um grande valor terapêutico no que se refere a redução da espasticidade e de contraturas por meio da água aquecida. Além de reduzir a dor e espasmos musculares, manter ou aumentar a amplitude de movimento, reeducação muscular, alongamento e fortalecimento muscular, encorajamento das atividades funcionais, manutenção e melhoria do equilíbrio, coordenação e postura, infecções respiratória, aumento da expectativa de vida, aumento dos níveis de integração, auxílio no enfrentamento da deficiência, favorecimento da independência, melhora da auto-imagem, auto-estima e satisfação com a vida, entre outros. Este estudo teve como objetivo mensurar e quantificar respostas relacionadas à força muscular de tronco após abordagens diferenciadas de tratamento fisioterapêutico, contribuindo para novas formas de intervenção em fisioterapia neurofuncional. Participaram desta pesquisa dois pacientes masculinos com diagnóstico de lesão medular em nível torácico, com idades de 28 e 40 anos. Foi utilizado como avaliação da mensuração da força muscular de tronco o dinamômetro da marca Crown, sendo realizado uma avaliação no inicio e outra no final do tratamento, totalizando 12 atendimentos. Um paciente recebeu tratamento hidroterapeutico associado a terapia neurofuncional e o outro somente a terapia neurofuncionnal. Os resultados foram realizados através de gráficos do excel com base de dados, e porcentagem simples. A partir dos resultados encontrados, verificou-se uma resposta positiva nos dois tratamentos, mas notou-se melhores resultados quando relacionado o tratamento a hidroterapia.

Palavras chave: força muscular de tronco, lesão medular e hidroterapia.