27 - DECUBITUS ULCER PREVENTION WHEELCHAIR IN INDIVIDUALS WITH THE USE OF VIBRATION PLATFORM.

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INTRODUCTION

The nervous system is to control the basic functions of sensitivity and motor skills, essential to the preservation of the individual and their environment performance. For Jackson (1931) the entire nervous system is a sensory-motor mechanism in which one does not exist without the other. Sensory stimulation is required to be interpreted so that a motor response.

The vitality of the muscle depends on the local tissue and trophic stimulus that come from motor cells of the spinal or cranial nerve nuclei, reaches through the nerve fibers. When the muscle fails to receive the trophic stimulation of the nervous system, fibers atrophy. Such an occurrence is seen in traumatic spinal cord injury total (NITRINI; BACHESCHI, 1991).

The spinal cord is organized into segments along its length. Each segment of the nerve roots innervate specific regions of the body. The segments are eight cervical cord (C1 to C8) and control sensitivity and movement of the neck and upper limbs. The thoracic segments (T1 to T12) control the chest, abdomen and part of the upper limbs. While the lumbar segments (L1 to L5) are related to movement and sensitivity of the lower limbs. The sacral segments (S1 to S5) control of the lower limbs, and genital sensitivity of bowel and bladder function (MACHADO, 2006).

The spinal cord is the part of the central nervous system that carries information from the brain to the body and body to the brain. Any injured spinal cord can affect movement and / or the sensation of the body and compromise the functioning of some internal organs. The level determines how much the injury to the spinal cord is affected. According to the American Spinal Injury Association (ASIA) spinal cord injury is defined as a decrease or loss of function and motor or sensory and may be complete or incomplete due to the trauma of neuronal elements within the spinal canal such as car accident or motorcycle cycling, diving, assault with a firearm, a fall resulting in injury to the spinal structures interrupting the passage of sensory and motor nerve stimulation through the spinal cord (FARO, 1995).

The injury may be complete or incomplete. A complete injury occurs when there is no voluntary movement below the injury and incomplete when there is no voluntary movement or some sensation below the level of injury. However, the spinal cord can also be damaged by diseases such as: in hemorrhages, tumors and virus infections (BARROS FILHO et al. 1994).

The trauma of the spine that causes the spinal cord injury will damage a complex neural network involved in the transmission, modification and sensory and motor coordination, beyond the control of autonomous systems and organs. Loss of homeostatic mechanisms and adaptation is part of the post-injury dysfunction (MERRITT, 2002).

To Nitrini; Bacheschi (1991) in spinal cord injury is complete paralysis, loss of all sensory sensitivity (tactile, thermal, painful, pressure and location of body parts in space) below the injury also occurs, changes in bowel control (urinary and feces). The cervical lesions determine high tetraplegia (paralysis of all four limbs). In tetraplegia, respiratory failure is frequent, due to involvement of the phrenic nerve which controls the contraction of the diaphragm. In low cervical lesions, there is paralysis of lower limbs and hands. In the chest, the paralysis is of lower limbs.

The place where the lack of sensitivity indicates the height of the lesion and guides the medical diagnosis. If the lack of sensitivity occur for example to the navel, spinal cord injury is occurring at the time of the tenth thoracic vertebra (MACHADO, 2006). According to Porter (2000) are the main complications: circulatory dysfunction, adequate circulation of blood the body is crucial to keeping alive the skin. When there is interruption of circulation for a long time, the cells die and bedsores occur. Usually arise in areas where the bones are poorly protected by muscle and heel, head and shoulder blades. The most common causes are the pressure of the mattress, chair seat or any hard surface in contact with skin. Many hours on a bed or wheelchair in the same position leads to an increased pressure on the skin. Simultaneously, the body weight pushes against the bones blood vessels. With this pressure from without and from within, blood circulation may be impaired in a particular region and then comes the decubitus ulcer or bedsore.

The authors Porto (2000) and Lianza (1985) report that the decubitus ulcer is not well cared for, this will increase the size and depth, affecting muscles and can reach the bone. Often, the sores become infected and, if the infection reach the bones, it is extremely difficult to cure and is a major cause of death in the injured spinal cord. For this reason, the skin should always be observed, especially in areas receiving greater pressure. The sores usually start as small areas that can be purplish red in no time to turn into a small wound. To avoid such an occurrence it is necessary to use eggshell mattress and pillows filled with air in addition to periodic change of positions of the patient. Make use of healthy eating, eating two to three liters of fluid a day, keeping the skin clean and dry and wear light clothing and comfortable are measures that help prevent pressure sores. Urinary dysfunction in most people with spinal cord injury does not have normal urinary control. The urinary system is responsible for production, storage and disposal of urine and is formed by the kidneys, ureters, bladder and urethra. The brain and spinal cord are responsible for coordinated work between the bladder and urethral sphincter, in order to control urine. A spinal cord injury may compromise communication between the brain and the urinary system and the elimination of urine stored in the bladder is no longer automatic. In the case of spinal cord injury is incomplete, there can be total or even partial recovery with time. But until this recovery occurs, the use of a technique for emptying the bladder may be necessary (STRIKE; AMATUZZI 1999).

Depending on the level of spinal cord injury, the bladder can take one of two types of behavior: 1) Go to accumulate less fluid than before the injury and the bladder muscles are replaced with involuntary loss of urine frequently - spastic bladder common in spinal cord injuries above T12, 2) starts to accumulate a larger amount of urine than before spinal cord injury because the bladder muscles do not contract and this causes large amount of urine is retained within the bladder, much higher normal capacity - flaccid bladder, common in spinal cord injuries below T12.

The diagnosis of type of bladder is important to define the type of treatment to keep the bladder with urine and low amount of pressure inside, preventing the reflux of urine from the bladder to the kidneys. Thus, preventing urinary tract infections, promoting continence and preserving kidney function (NITRINI; BACHESCHI 1991). Bowel dysfunction in spinal cord injury determines bowel control. In lesions of the highest level, the disorder is mainly related to the inactivity of the intestinal wall (tendency to chronic constipation, constipation) and lowest in lesions with incontinence (tendency to accidental bowel

movements). Although most spinal cord injuries is not possible the recovery of bowel control, a re-education program can make the intestines work always in the same time, making it easier to activities outside the home. The basic rules for bowel retraining are: diet rich in vegetable fiber, adequate fluid intake (2 to 2.5 liters per day), perform exercises daily, have a schedule to stimulate bowel movements, abdominal massage in order to time at the time of emptying and, when necessary, use laxatives, as natural as possible.

All these procedures should be directed by a physician (TONELLI, 1999). The autonomic dysreflexia is a common complication in cervical lesions and can also occur in spinal cord injuries above T6. Any stimulus that normally cause pain and discomfort in the person without injury, the person who does not feel because of a spinal cord injury can cause a crisis of dysreflexia. The most common causes are bladder or bowel full and distended. The most frequent symptoms of autonomic dysreflexia are: headache, seeing bright spots, blurred vision, chills above the level of injury, sweating above the lesion, red patches on the skin above the lesion level, nasal obstruction and low heart rate . Uncontrolled high blood pressure and the result is more dangerous.

The dysreflexia is a medical emergency and requires medical attention (Trombly, 1989). At the stroke when the body is not moved regularly, there is a possibility to occur the appearance of a blood clot called a thrombus. The thrombus formed in the leg can break off and travel to other parts of the body. If this occurs, the thrombus is now called the plunger, and one of the most common places to stay for a plunger is the lungs (pulmonary embolism). The most common signs of thrombosis are: calf or thigh of a leg warmer and edematous (swollen) than the other. In the presence of these changes, medical evaluation and treatment are needed. In the main pulmonary embolism pulmonary embolism symptoms are: sudden drop in breathing, chest pain or back pain and cough of sudden onset. If there is suspicion of pulmonary embolism, should seek emergency care immediately (BROMLEY, 1997 In some patients with syringomyelia, spinal cord injury, even several years after injury, become painful, rise of sensory or motor level (for example, a paraplegic patient that suffered a numbness, atrophy and weakness in one hand) increased muscle tone, change the standard urine (urgency, is to provide retention), abnormal sweating, or even complaints such as dysphagia (difficulty swallowing). In many hospitals, imaging studies show the formation of cavities in the central canal of the spinal cord, spanning several levels above and below the traumatic injury, and are called post-traumatic syringomyelia. According to Machado (2006, p.207), this process destroys the central intermediate gray matter and white commissure. Such destruction causes a disruption in some fiber tracts. As a result, there is loss of thermal and pain sensitivity on both sides, but does not occur in these areas any disturbance in proprioception. Treatment may require surgery (TARICCO et al. 2009). It is common in patients with spinal cord injuries occur in mood disorders, particularly depression and anxiety, hence the importance of early intervention of the rehabilitation team, as well as inclusion in sporting activities and socialization (SARAH Network, spinal cord injury).

The trauma of the spinal cord is a worldwide health problem due to the neurological damage often associated with a higher incidence in adult males. The pressure ulcers or decubitus ulcer or pressure sore is a skin lesion caused by an interruption of blood circulation in a given area, which develops due to an increased pressure for a prolonged period in the same position. The term used to be sore when you have a part or necrosis, a black scab in the lesion. The initial phase of spinal cord trauma, even when the patient is bedridden, this should be changed in position every two hours. Preferably place it on a bed that better distribute the pressure over the bony prominences, for example, eggshell mattress or water mattress (LIANZA, 1985).

VIBRATION PLATFORM

The scientific concept of vibrating platform was developed nearly 25 years, the former Soviet Union to combat bone loss that occurred during the stay of astronauts in space. With daily use for 10 minutes these astronauts managed to stay in orbit for 420 days, while American astronauts were able to a maximum of 120 days, as they returned to earth with severe muscle and bone. The first application was therefore in the treatment of osteoporosis. With the vibration can be 100% of the working muscles (Batista et al. 2007).

The vibrating platform to be used has Triaxial vibration. The vibration stimulus is produced in three different planes (vertical, horizontal and diagonal). According to the manufacturer's specifications, this system is able to work all muscle groups, not only oriented in a longitudinal direction.

The time of exposure to vibration is an important aspect in terms of security, because the vibrations are designed to increase activity in specific muscles and exercises, so the practitioner should only be exposed to vibration over time and when needed. Studies of workers subjected to vibration in their work activities point out that overexposure to vibration can have deleterious effects on the body (BOVENZI et al 2005).

The vibrating platform used in this study allows you to select frequencies of 30, 35, 40 and 45 Hz that can be used in accordance with the objective to be achieved. You can select two wavelength settings: a low amplitude (L) has a traveling wave peak to peak from 1 to 2 mm and a high amplitude (H) has a traveling wave peak to peak 3 4 mm. This way, you can set a series of training 30, 45, 60 and 90 seconds.

The deck plate is lined with yoga mat 10 mm thick for added comfort, especially for exercises that require support of the upper extremities, hip or buttock. It also presents side straps to exercise the upper limbs. Adopting different postures enhances the right to exercise certain parts of the body.

According to Stewart et al. (2005) plantar vibration serves to significantly enhance peripheral and systemic blood circulation, peripheral lymph flow and venous drainage, which may explain the apparent ability of these stimuli to influence bone mass. Research Maloney-Hinds (2008) show that five minutes of 30 Hz or 50 Hz vibration produced significant increases in skin blood flow.In the late nineteenth century, in the sixties, Dr. John Harvey Kellogg, the German scientist W. Biermann and Russian scientist Vladimir Nazarov pioneered research using vibration for therapeutic purposes.

In 1999 Gus Van de Meer, one of the coaches of the Dutch Olympic team started to use vibration to train people healthy and without physical fitness. Power Plate has developed the platform and created training programs that would meet the needs of the sectors of health and physical condition.

Among the physical methods of treatment of bone diseases, the vibrating platform is being used today. The vibration generated by the platform because the same bone deformity that exercise impact, but their movements should have high vibratory frequency and low intensity to avoid the risk of injuring the tissues. According to Tihanyi et al. (2007) the vibrating platform can increase strength and promote voluntary muscle activation of muscles affected by stroke. The vibrating platform activates the blood circulation through the vibration, according to Stewart et al. (2005). According to Malone, Hinds et al. (2008) the frequency of 30 Hertz or 50 Hertz produces significant increase in circulation to the skin. This mechanism causes the risk of development of decubitus ulcers is reduced. This fact is against the survey.

The wheelchair has deficiency of blood circulation in the paralyzed parts and spend much time sitting, is subject to the development of bedsores. Another important aspect is related to the gain in bone mass with atrophy of muscles, bones weaken and lose bone substance. According to Xiang-Yan et al. (2008) the vibrating platform has the effect of piezoelectricity, thus

stimulating the osteoblasts to synthesize bone matrix. These authors observed, using the vibrating platform, gain of bone mass and reducing pain in postmenopausal women with osteoporosis.

One of the problems wheelchair users are the constants of pressure sores due to lack of blood flow in certain areas (Barros Filho et al. (1994); BROMLEY (1995), FARO (1995), Nitrini; Bacheschi (1991) and LIANZA (1985). In addition, the wheelchair needs a lot of strength of the trunk and upper limbs for locomotion in a wheelchair. The vibration platform works in 97% muscle, which is why the gain of this fabric is fast (SANTIN-MEDEIROS, VALLEJO, 2009).

In Brazil, there are few studies relating quality of life and spinal cord injury. The vibration platform emerges as a new device that numerous research studies may result, combining to improve the quality of life of spinal cord injuries and new scientific knowledge through the work using the vibrating platform.

OBJECTIVE

The goal of this research will improve the blood circulation of the wheelchair, through vibration and strengthen the muscles of the upper limbs for better independence of the individual.

MATERIALS AND METHODS

The research presented refers to a case study of a volunteer young male with traumatic spinal cord incomplete low. The research proposal was to use the vibrating platform as a means to avoid the appearance of decubitus ulcers in a patient who had already acquired ulcer in his life of wheelchair. The exercises were performed in the seated position on the vibration platform without the use of accessories such as: weight, elastic, among others. In this position, the individual was placed on a cushion of air to the exercises, in order to avoid any friction in position. After the adjustment period of two weeks the volunteers began working with the accessories.

The worked on the vibration platform consisted of three times per week on alternate days for 9 months, with a frequency of 30 Hz, low amplitude of 1-2mm for 15 continuous minutes. The training consisted of strength training, stretching, strength and relaxation. In all training sessions, two people were near the wheelchair during the development of exercises to assist in the exchange of positions and provide greater security. Velcro straps were used, according to the need, in order to stabilize the joints to the exercises.

The prosthesis used a wheelchair to lock the knee and was thus possible to perform the work platform with the individual standing on it.

The pulse and blood pressure were always measured before and after training on a vibrating platform.

RESULTS

Throughout the work on the vibration platform was not observed the appearance of bedsores, which is common in a person who uses a wheelchair and that remains long hours sitting. The skin of the volunteer has stayed healthy and flourishing with color. The increased blood circulation was detected by increased sweating of the individual to exercise on the platform. There was gain in muscle strength of upper limbs, observed by increasing the time of the wheelchair to walk with a walker (a half hour to one hour) and thereby gaining greater independence in daily activities.

The mean initial and final pressures were respectively 12 / 9 and 13 / 9. The mean pulse rate at baseline was 90.9 and the final was 84.6. The data show increases in blood pressure with decreased pulse at the end of the exercises. However, according to Cormier et al. (2006), David et al. (2008), Boaro et al. (2011) found that there was an increase in muscle strength in people who have worked in the whole body vibrating platform.

CONCLUSION

In the situation where a person stays too long sitting in a wheelchair the vibrating platform enables a more efficient return of blood to avoid bedsores. The exercise program vibrating platform strengthened the muscles of the upper limb.

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DECUBITUS ULCER PREVENTION WHEELCHAIR IN INDIVIDUALS WITH THE USE OF VIBRATION PLATFORM.

SUMMARY

Spinal cord injury is defined as a decrease or loss of motor function and or inside the spinal canal such as car accident or motorcycle, diving, assault with a firearm, or diseases falls, for example, in hemorrhages, tumors and infections by viruses. These incidents result in injury to the spinal structures, stopping the passage of sensory and motor nerve stimulation through the spinal cord. The inability of the individual varies with the height and degree of injury to the spinal segment involved. A major complication is the circulatory dysfunction. The proper circulation of blood in the body is crucial to keeping alive the skin. When there is interruption of circulation for a long time, the cells die and arise decubitus ulcers or bedsores. Ulcers usually appear in areas where the bones are poorly protected by muscle and heel, head and shoulder blades. The most common causes are the pressure of the mattress, chair seat or any hard surface in contact with skin. Individuals who use a wheelchair to get around are likely to acquire bed sores. Often, the sores become infected and, if the infection reach the bones, it is extremely difficult to cure and is a major cause of death in the injured spinal cord. For this reason we applied the vibrating platform to work on an individual wheelchair with incomplete spinal cord injury low. The aim was to improve blood circulation through exercises on a vibrating platform. The results show that throughout the period worked the volunteer showed no decubitus ulcers and improved the strength of the upper limbs.

KEY-WORDS: vibration plate, blood circulation, pressure sores

FAUTEUIL ROULANT PRÉVENTION DES ULCÈRES DE DÉCUBITUS CHEZ LES PERSONNES ATTEINTES L'UTILISATION DE PLATEFORME VIBRANTE.

RÉSUMÉ

Lésion de la moelle épinière est définie comme une diminution ou une perte de fonction motrice et ou à l'intérieur du canal rachidien, comme un accident de voiture ou de moto, plongée, agression avec une arme à feu, ou des maladies des chutes, par exemple, dans les hémorragies, les infections et les tumeurs par des virus. Ces incidents entraînent des blessures à la colonne vertébrale des structures, l'arrêt du passage de la stimulation des nerfs sensoriels et moteurs dans la moelle épinière. L'incapacité de l'individu varie avec la hauteur et le degré de blessure pour le segment rachidien impliquées. Une complication majeure est la dysfonction circulatoire. La bonne circulation du sang dans le corps est crucial de maintenir vivante la peau. Quand il ya interruption de la circulation pendant une longue période, les cellules meurent et se posent les escarres ou d'escarres. Ulcères apparaissent généralement dans les zones où les os sont mal protégés par les muscles et les lames du talon, la tête et des épaules. Les causes les plus fréquentes sont la pression de l'assise de la chaise, matelas ou toute surface dure en contact avec la peau. Les personnes qui utilisent un fauteuil roulant pour se déplacer sont sensibles aux escarres acquisition. Souvent, les plaies s'infectent et, si l'infection atteint les os, il est extrêmement difficile à guérir et est une cause majeure de décès dans la moelle épinière lésée. Pour cette raison, nous avons appliqué la plateforme vibrante pour travailler sur un fauteuil roulant individuel avec peu incomplète sur les traumatismes médullaires. L'objectif était d'améliorer la circulation sanguine à travers des exercices sur une plateforme vibrante. Les résultats montrent que tout au long de la période travaillée le bénévole n'a montré aucune amélioration des escarres et la force des membres supérieurs.

MOTS-CLÉS: plaque vibrante, la circulation sanguine, ulcère de décubitus

LA PREVENCIÓN DE ÚLCERAS POR DECÚBITO EN SILLA DE RUEDAS EN INDIVIDUOS CON EL USO DE LA PLATAFORMA VIBRACIONES.

RESUMEN

La lesión medular es definida como una disminución o pérdida de la función motora y, o dentro del canal espinal, tales como accidentes de coche o moto, buceo, asalto con arma de fuego, caídas o enfermedades, por ejemplo, en las hemorragias, tumores e infecciones por virus. Estos incidentes resultado en lesiones a las estructuras de la columna vertebral, detener el paso de la estimulación nerviosa sensitiva y motora a través de la médula espinal. La incapacidad de la persona varía con la altura y el grado de lesión en el segmento de la columna en cuestión. Una complicación importante es la disfunción circulatoria. La correcta circulación de la sangre en el cuerpo es fundamental para mantener viva la piel. Cuando hay interrupción de la circulación por un largo tiempo, las células mueren y surgen las úlceras por decúbito o escaras. Las úlceras suelen aparecer en las áreas donde los huesos están bien protegidos por el músculo y las hojas del talón, la cabeza y el hombro. Las causas más comunes son la presión de los asiento de la silla colchón, o cualquier superficie dura en contacto con la piel. Las personas que usan silla de ruedas para moverse son susceptibles a las úlceras de decúbito adquisición. A menudo, las lesiones se infectan y, si la infección

al hueso, es extremadamente difícil de curar y es una de las principales causas de muerte en la médula espinal lesionada. Por esta razón, hemos aplicado la plataforma vibratoria para trabajar en una silla de ruedas individual con incompleta bajo con lesión medular. El objetivo era mejorar la circulación sanguínea a través de ejercicios sobre una plataforma vibratoria. Los resultados muestran que durante todo el período trabajado los voluntarios no mostraron úlceras de decúbito y la mejora de la fuerza de las extremidades superiores.

PALABRAS CLAVE: plataforma vibratória, circulación de la sangre, úlceras por presión

PREVENÇÃO DE ÚLCERA DE DECÚBITO EM INDIVÍDUOS CADEIRANTES COM A UTILIZAÇÃO DE PLATAFORMA VIBRATÓRIA.

RESUMO

A lesão medular é definida como sendo uma diminuição ou perda da função motora e ou dentro do canal vertebral tais como acidente automobilístico ou moto, mergulho, agressão com arma de fogo, quedas ou por doenças como, por exemplo: em hemorragias, tumores e infecções por vírus. Estas ocorrências resultam em lesão das estruturas medulares, interrompendo a passagem de estímulos nervosos sensitivos e motores através da medula espinhal. A incapacidade do indivíduo varia de acordo com a altura e grau da lesão do segmento medular envolvido. Uma das principais complicações é a disfunção circulatória. A circulação adequada de sangue no corpo é fundamental para manter viva a pele. Quando ocorre interrupção da circulação por um tempo prolongado, as células morrem e surgem as úlceras de decúbito ou escaras. As úlceras aparecem, geralmente, em áreas onde os ossos são pouco protegidos por músculos como calcanhar, cabeça e escápulas. As causas mais comuns são a pressão do colchão, assento de cadeira ou alguma superfície dura em contato com a pele. Indivíduos que utilizam a cadeira de rodas para se locomover estão susceptíveis a adquirir escaras. Frequentemente, as escaras infeccionam e, se a infecção chegar aos ossos, à cura é extremamente difícil e é uma das principais causas de morte no lesado medular. Por esta razão foi aplicado o trabalho em plataforma vibratória a um indivíduo cadeirante, com lesão medular incompleta baixa. O objetivo da pesquisa foi melhorar a circulação sanguínea através de exercícios em plataforma vibratória. Os resultados mostram que durante todo o período trabalhado o voluntário não apresentou úlceras de decúbito e melhorou a força dos membros superiores.

PALAVRAS CHAVE: plataforma vibratória, circulação sanguínea, úlcera de decúbito