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Effects of Motomed gracile leg training on the lower limbs function in children with spastic cerebral palsy

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Abstract
Objective: To observe the effect of MOTOmed gracile on spastic cerebral palsy.
Methods: 48 cerebral palsy children were divided into two groups: intervention group (n=24) and control group (n=24). The children in the control group accepted comprehensive rehabilitation, while the children in the intervention group were trained additionally with MOTOmed gracile. They were evaluated according to the Asworth scale and manual muscle testing (MMT) 6 months after treatment.
Results: The scores of intervention group improved more significantly than those in the control group (P0.05)
Conclusion: MOTOmed gracile can facilitate the improvement in children with spastic cerebral palsy.
Key words: MOTOmed gracile, cerebral palsy, rehabilitation, muscle strength, muscle tension, spasm
Source: http://en.cnki.com.cn/Article_en/CJFDTOTAL-ZKLS200909015.htm

Spastic cerebral palsy is the most common type of cerebral palsy (60 % - 70 % of affected children). In the long run spasms lead to contractions of joints. One of the main objectives of physiotherapy of patients suffering from spastic cerebral palsy is to reduce muscular tone and to strengthen leg muscles.

1. Documents and methods

1.1 **In general:** Between August 2006 and January 2009, 48 patients suffering from spastic cerebral palsy were admitted to our rehabilitation center, corresponding to the directives for diagnosis which were defined by the national commission for research of cerebral palsy. They were divided into two groups: one intervention group consisting of 24 patients ages between 0 and 4 years with an average age of 3 years, with 14 male and 10 female patients, and a control group of 24 patients ages between 2 and 5 years with an average age of 3.25 years, and 11 male and 13 female patients. There were no significant differences concerning the patients' clinical features and impairments in both groups (P>0.05).

1.2 Methods:

1.2.1 Control group: Comprehensive physiotherapy training was conducted, including amongst others manual therapies according to Bopath and Voita, movement therapy, the „in the field" method (Japan), and moreover training for expanding the joints' range of motion, acupuncture, standing frame, balance training, low current pulse. The manual therapies took place semi daily, acupuncture, standing frame and balance training daily, 5 applications were carried out each week for a total time of 6 months.

1.2.2 Intervention group: In addition to the therapy methods mentioned above, MOTOmed gracile leg training (by the German Reck company) was included. The training was conducted 5 times per week for 20 min every day, for 6 months overall.

1.3 **Basic concept of the success analysis:** The muscle tone in the legs was measured 6 months before and after the training according to the modified Ashworth Scale. Strength in the arms and the Quadiceps femoris was measured by means of the manual muscle function test (MMT).
Measure criteria for therapeutic success:

1) Muscle tone: very successful: muscle tone with normal values or a decrease of 2 or more levels; successful: a decrease of 1 level after therapy; unsuccessful: no decrease of the tone after therapy.
2) Muscle strength: very successful: muscle strength with normal values or an increase of strength of 2 or more levels; successful: increase of muscle strength by 0.5 or 1 level; unsuccessful: no increase in muscle force after training.

1.4 **Statistic methods:** Statistic evaluations were established by means of SPSS 11.0, the significance level was: $\alpha = 0.05$.

2. Conclusion

2.1 Muscle tone: In the intervention group 18 participants were rated as very successful and 6 as unsuccessful. The total success rate was 75 %. In the control group 11 participants were „very successful", whereas 13 remained unsuccessful, the total success rate was 45.8 % ($x^2 = 4.51$. P<0.05).

2.2 Muscle force: In the intervention group 20 participants were very successful and 4 were unsuccessful, the total success rate was 83.3 %, on the other side 10 participants of the control group were very successful and 14 unsuccessful, the total success rate is therefore 41.7 % ($x^2 = 4.63$. P<0,05).

3. Results

Cerebral palsy is a chronic disease developing from neurologic damage before, during or one month after birth which effects the functions of the cerebrum. It is a common infantile physical disability; the spastic type is the one with the most frequent occurrence. Spasm control is an important part in cerebral palsy therapy. Our rehabilitation center has been working for a long time quite successfully with comprehensive movement therapy and physiotherapy in the treatment of spastic cerebral palsy. In April 2007 our rehabilitation center purchased a MOTOmed gracile. We have been using the device comprehensively in cerebral palsy therapy, which good results are proven in this study. One of the most important functions of the MOTOmed gracile is the spasm control which automatically detects an increased muscle tone during the course of training, recognizes spasms and treats them accordingly. The principle of this function is: As soon as the device detects a spasm, it slows down carefully and stops, afterwards it changes direction in order to slowly loosen the spasm and loosen the muscles. At the same time muscles and joints are prevented from being damaged.

ServoCycling is another important function of the MOTOmed gracile. The patient can train passively even with minimal residual muscle strength, the resistance is reduced to 0 with the ServoCycling function, therefore the patient can train actively even with minimal strength. Here the motor takes over the movement which the patient cannot carry out by himself. The patient can start training actively against an adjustable resistance as soon as he has enough own strength. Therefore the device offers three different trainings modes, passive training, assistive training and active training. Furthermore we could observe during training that coordination, symmetry and flexibility of the legs are also improved.

Leg training by means of the intelligent movement trainer is effective in the treatment of cerebral palsy and we therefore recommend it.

GB 713.6/W67