Whole Body Vibration in Children with SMA Type II and III

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1 Conclusion

In a preliminary study we could show that Whole-Body-Vibration-Training integrated in functional physiotherapy is a feasible exercise-method for children with SMA. Since the disease itself shows slow progression it could be a success to stabilize motor functions. Such stabilization and even some improvement could be achieved in 6 of 7 children.

2 Introduction

Spinal muscle atrophy (SMA) is an incurable disease which is associated with high morbidity in childhood and reduced life expectancy. So far there is no specific therapy available. With regard to physiotherapy there is still controversy about how much is beneficial. Recent literature indicates that physical exercise can support the survival of motoneurons in SMA-mice (1). On the other hand there is no evidence on which kind and how much physiotherapy is beneficial. Therefore we analyzed the effects of Whole Body Vibration (WBV) integrated in functional therapy (including NDT).

3 Patients

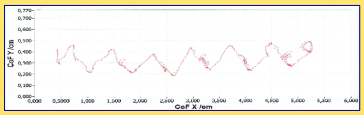
We included 7 children, 5 with with SMA type II and 2 with SMA type III. Age range was 2,5 to 9 years (4 males, 3 females).

4 Intervention

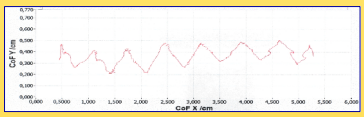
The programme lasted 6 months and started with a 2 week period of intensive training at the Cologne Rehabilitation Center. During these two weeks patients received 4h of intensive physiotherapy per day including NDT and WBV. The latter was applied by a side alternating vibration platform (Galileo® System Kipptisch) and performed 3x3 minutes three times a day in different positions.
After these 2 weeks the patients continued the WBV at home for 6 months, interrupted of an other week of intensive training and control by physiotherpist.
For evaluation a modified Gross Motor Function Measurement (mGMFM) (2) was performed at the beginning and after 6 months. In addition muscle Force was determined by measuring maximum force that can be developed when pushing off a plate with feet from a semi lying position (45°).

5 Results

Regarding **mGMFM** 3 children showed an improvement of 9-16%, 3 children remained equal and only one had a decline of 8% in mGMFM criteria.
Best results of mGMFM were seen in the “sitting” dimension. In this dimension there was no decline and 5 patients had improvement (0-15%).
Regarding **muscle force**, we saw improvement in 4 patients, one stayed equal, one missed the investigation and one had a decline.
Looking for side effects**,** there was one patient who showed notable increase of knee **contractures** and 3 that had slight increase, 2 patients stayed equal while one patient showed reduced contractures after 6 months.
The patient with decline in mGMFM and muscle force was the same one that had the notable increase of knee contractures. He suffered from severe pneumonia during the training period which led to constitutional decline.



Start Therapy
max. Force: 0,49 kN
max. Power: 0,07 kW



6 Months
max. Force: 0,45 kN
max. Power: 0,47 kW

Above an analysis of gait is shown, measuring Center of Force on a platform (Gangway, by Novotec®). This result is from one patient with SMA III who did not show a change in mGMFM. But obviously there was much more stability in his gait and max. power went up (max. force gets less when gait gets smoother).

6 Discussion

Only one of the 7 children showed decline of motor function, but most likely due to intercurrent severe pneumonia, since he partially recovered while continuing the training. None showed generalised increasing muscle weakness during the training period and all of them said, they had some benefit, allthough not always measurable in mGMFM. The only noticed side effects where increasing contractures in some children, but it remains unclear whether they were caused by training or by common progress of the disease. Due to small numbers and heterogenity of the patients no statistical evaluation was possible and further studies should be performed.

Literature: (1) Regular Exercise Prolongs Survival in a Type 2 Spinal Muscular Atrophy Model Mouse (Grrondard et al, Th Journal of Neuroscience17, 2005- 25(33):7615-7622
(2) GMFM und GMFCS (Rusell J. et al 2006, ISBN 3-456-84230-9
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