



# Effects of Hippotherapy on Balance in Patients with Multiple Sclerosis: A Meta-Analysis

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## Introduction

Multiple sclerosis (MS) is the most common immune-mediated demyelinating disease of the central nervous system. Aside from trauma, it is the most common cause of permanent disability in young adults [1]. Common manifestations of multiple sclerosis are sensory loss in limbs or on the face, unilateral vision loss, motor weakness, and balance and gait problems. Patients may also have bladder complications, limb ataxia and pain [2].

Currently, there are no curative treatments for multiple sclerosis; individualized therapeutic regimens are based on the patient's specific symptoms, comorbidities, and treatment goals. In addition to medication, gait and balance impairment are often treated with physical therapy and the use of mobility aids such as ankle foot orthosis, canes, walkers, and wheelchairs [3]. Similarly, techniques such as aquatic exercise, massage, and psychological counseling are falling into favor with patients and practitioners, as these treatment styles fill in treatment gaps where medications have failed. Still, there exists a gap in desired outcomes and current capabilities of first-line treatment. An alternative that may be used is Hippotherapy.

Hippotherapy is a modality of therapy wherein the movement of a horse is used as treatment, specifically in those with neuromusculoskeletal disorders such as cerebral palsy, multiple sclerosis, and parkinson's disease. Movement of the horse gives the rider motor and sensory inputs that stimulate the patient's postural reflex, helping improve balance and coordination [4].

The aim of our analysis is to determine the efficacy of hippotherapy on improving balance, as measured by the Berg Balance Scale, in individuals with multiple sclerosis.

## Methods & Materials

We searched PubMed, Google Scholar, and Ebscohost using the key word 'hippotherapy' in conjunction with 'multiple sclerosis'. Full-text articles were selected. The following information was obtained from each study: population demographics<sup>1</sup>, length of study, study design, outcome measurements, and results. Studies that included a pre and post intervention balance measurement using the Berg Balance Scale (BBS) were selected to measure effect size of hippotherapy. These studies consisted of hippotherapy intervention (non-experimental trials), a hippotherapy intervention with a control condition (experimental trials), or a hippotherapy intervention with another exercise therapy intervention, and all ranged from 6-18 weeks (mean 12.4). We excluded studies which included data from individuals with other neuromuscular disorders.

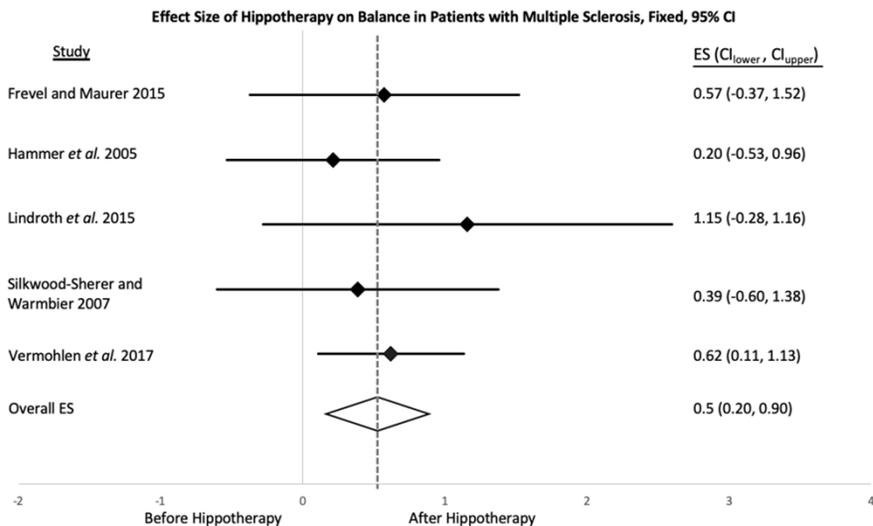
<sup>1</sup> Population demographics: All participants were 18 years of age or older, included both males and females, had no acute exacerbation four weeks prior to enrollment, and received a physician referral.

## Results

Study Author, year	ES	CI Lower	CI Upper	% Weight	N
Frevel and Maurer 2015	0.57	-0.37	1.52	13.5	8
Hammer <i>et al.</i> 2005	0.21	-0.53	0.96	21.8	13
Lindroth <i>et al.</i> 2015	1.16	-0.28	2.60	5.9	3
Silkwood-Sherer and Warmbier 2007	0.39	-0.60	1.38	12.4	7
Vermohlen <i>et al.</i> 2017	0.62	0.11	1.13	46.4	30

Test for overall effect of Hippotherapy on Balance using pre-/post- BBS measures in patients with MS:

**Z = 2.966, p = 0.003**



## Discussion

The analysis shows that hippotherapy does improve the balance in patients with multiple sclerosis. The results in the Forest Plot indicate a statistically significant positive effect on balance (p=0.003).

Clinically, improvement of balance in patients with MS helps preserve movement, which is critical for maintenance of health, fitness, and quality of life. Balance dysfunction has been linked to gait abnormalities; improving balance can potentially help improve such abnormalities [3].

Hippotherapy is a multisensory activity that can affect muscle tone, strength, and coordination. Improvement in such areas can help decrease the risk of falls, improve gait, balance, and rehabilitate postural musculature. These symptoms are common in many neurodegenerative disorders and hippotherapy has been implicated as an adjunctive treatment in disorders other than MS [4].

## Limitations:

Objective assessment of the level of disability in patients with MS is difficult to achieve due to the complex nature of the disease, comfort tolerances, and treatment compliance [8,9]. A variety of tests can be used to assess treatment outcomes, however, no one test is both universally accepted and sensitive [5-9]. This shortcoming unfortunately resulted in exclusion of two articles from this meta-analysis that did not use BBS as a measurement of treatment outcomes.

It is important to note that the BBS for patients with MS includes scores ranging from 0-56. Individuals starting with a higher BBS score could not achieve the same linear progression as an individual who started out with a lower BBS score. This limits the effect size of each study.

## Conclusion

Multiple Sclerosis is a detrimental neurodegenerative disorder that leads to a shortened life expectancy and impaired quality of life in affected individuals. Our analysis suggests a statistically significant improvement of balance in patients with MS can be achieved with hippotherapy. This study highlights the necessity to follow the long-term effects of hippotherapy on balance in patients with MS.

## Future Recommendations

The studies listed in our meta-analysis do not provide us with future follow up on patient BBS scores involved in the experimental leg. Thus, we can only infer on the immediate gains of hippotherapy and not its residual benefits. Since MS patients have an average lifespan of approximately 25-35 years post diagnosis, long term benefits of hippotherapy are likely to be more captivating to the MS demographic.

## References

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