

The Effects of Hippotherapy on Motor Performance in Veterans with Disabilities: A Case Report

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Abstract

The purpose of this case report was to compare traditional physical therapy to hippotherapy combined with traditional physical therapy on the motor performance of a 34-year-old male military veteran with low back and neck pain. Hippotherapy, as a treatment strategy, uses the movement of a horse to improve the subject's neuromuscular function and sensory processing through the motion of the horse in its variety of gait. Outcome measurements for this subject included the Sheehan Disability Scale, Oswestry Low Back Pain Questionnaire, and the Neck Disability Index. The combination of hippotherapy and traditional physical therapy resulted in greater improvements in disability scores on all three outcome measures compared to traditional physical therapy alone.

Key words: hippotherapy, veteran, low back pain, physical therapy, equine

Background

American Hippotherapy Association¹ (AHA) defines hippotherapy as a physical, occupational, and speech-language therapy treatment strategy that uses equine movement as part of an integrated intervention program to achieve functional outcomes. Using a horse in therapy was beneficial for many reasons.^{2,3,4,5} The horse's pelvis demonstrated a three-dimensional movement pattern similar to a human's pelvis while walking,^{3,4,5} which provides rhythmic and repetitive physical and sensory input to the client.^{2,3,4,6} The variability of the horse's steps allows the therapist to evaluate the degree of input to the subject, and then use this movement in combination with other treatment strategies to reach desired therapy goals.⁵ The horses' gait established a foundation for improving neurological function and sensory processing, which can be instrumental to a wide range of daily activities in addition to addressing functional outcomes and therapy goals.^{4,7} According to Meredith S. Bazaar,¹ a licensed speech-language pathologist, board certified hippotherapy clinical specialist, sensory integration via hippotherapy, simultaneously addresses the vestibular, proprioceptive, tactile, visual, olfactory, and auditory systems. Therefore, movement of the horse helps accomplish speech, language, swallowing, cognitive, physical, and occupational goals that were established in therapy.

Rationale

Hippotherapy is useful in physical therapy. Horse

based therapy facilitates balance and posture control, increased strengthening and assists in an improved range of motion.⁸

Current research demonstrates that hippotherapy is beneficial for those with developmental, skeletal, psychological, or neuromuscular conditions.⁹ Examples of such disabilities include cerebral palsy, arthritis, amputation, scoliosis, Down syndrome, traumatic brain injury, and spina bifida. Most commonly the patients were children, with lower extremity spasticity due to neuromuscular disorders receiving hippotherapy (e.g., cerebral palsy, spinal cord injury).¹⁰ Hippotherapy remained an experimental treatment for all diagnoses due to the limited quantity of published literature supporting its efficacy in individuals with disabilities.

Research Design

The researchers obtained approval for the hippotherapy study from the Arkansas State University Institutional Review Board. Participants are referred to the program either through self-referral, physician referral or through the Beck Pride Center. As not all participants present with comparable impairments, a single subject design permits reporting of outlying cases in the literature. Therefore, a single subject design examined the interactive effect of two or more treatments (control and treatment).¹¹ In this study, the effectiveness of hippotherapy in conjunction with traditional physical therapy, the experimental treatment, was compared with the control treatment of traditional physical

therapy in an individual patient. Several data points were collected after each treatment session to allow more accurate measurement of overall functional improvement. Sufficient data points permitted a publishable report based on the subject's unique disability.

The risks associated with this study included but were not limited to falls, muscle injuries, and fractures. Therefore, subjects included must be 18 years of age or older and have a physician determined need for physical therapy. Individuals with severe horse allergies, unstable fractures, atlanto-axial instability (excessive movement at the junction between the first two cervical vertebrae), or the inability to balance in a seated position could not participate in the study.

After a licensed physical therapist determined that the subject was eligible for participation and obtained informed consent, the subject was randomly assigned to Treatment A via a coin flip. In this first treatment group, he received both hippotherapy and traditional physical therapy, each for one hour once per week. After 15 weeks in Treatment A, the subject moved to Treatment B, receiving traditional physical therapy twice a week for one hour. The study lasted for 30 weeks, and the same physical therapist oversaw the duration of the patient's care in both groups. Three main outcome measures were collected after individual treatment sessions: the Sheehan Disability Scale (SDS; Sensitivity 0.83, Specificity 0.6912), the Oswestry Low Back Pain Questionnaire (OLBPQ; Sensitivity 0.76, Specificity 0.6313), and the Neck Disability Index (NDI; Sensitivity 0.74, Specificity 0.6614).

Case Presentation

The subject was originally referred to the study through the Beck Pride Center. He was a 34 year old male with a history of low back pain, neck pain, and a moderate stutter secondary to post-traumatic stress disorder (PTSD). He has lived with all of his impairments since he was discharged from the service.

Intervention during a one hour hippotherapy session involved retrieving the horse from the pasture or stall; tacking the horse (putting on appropriate gear to ride, i.e. saddle, etc.); brushing and grooming the horse; mounting the horse via the use of the mounting ramps; riding the horse facing forward, backwards, and sideways; performing strengthening and stretching exercises; changing directions and speeds while on the horse; dismounting the horse via the mounting ramps; untacking the horse and returning the horse to the pasture or stall. Every session was performed by a licensed physical

therapist, certified in hippotherapy as recognised by the AHA, along with a trained horse handler, and two trained side walkers. At the end of each session a licensed physical therapist evaluated the patient, and the patient completed a questionnaire evaluating improvement.

A traditional physical therapy session lasted approximately one hour and was the same during both experimental and control phases of the program. Intervention for the subject included stretching and strengthening exercises, manual therapy, educational training, and physical agents such as hot packs, cold packs, ultrasound, and electrical stimulation. At the end of each session, the subject was evaluated by a licensed physical therapist and then filled out a questionnaire evaluating improvement.

Measurements of motor performance were taken following each session. Evaluations included a range of motion, strength, balance, gait analysis, and posture. The results were analysed and compared to see if they are similar or different.

Tools used to measure changes as a result of treatment included a NeuroCom Balance Master, Gait Rite, Parotec Gait System, Lite Gait, Biodex, and functional scales. Other equipment utilised in treatments included an equine approved helmet, tack equipment- saddle, bridle, brushes, etc., gait belts, mounting ramps, Life System, and therapeutic exercise.

Examination Findings- Data and Analysis

The results of the three main outcome measures (SDS, OLBPQ, & NDI) were graphed and visual analysis was used to evaluate the graphs of the single subject data. Visual analysis was selected because, with basic information, outcomes can be accurately predicted using this method.¹¹ Data trends for all three measures showed the subject's marked improvement with the addition of hippotherapy to his treatment program. The subject reported decreased low back and neck pain following hippotherapy sessions. In addition, as therapy progressed the subject's stutter, present at initial evaluation, became less frequent and eventually disappeared.

While all three measures showed numerical improvement, only the Sheehan Disability Scale reached statistical significance according to visual analysis (Figures 1 & 2). The Oswestry Low Back Pain Questionnaire and Neck Disability Index both demonstrated clinical significance by improving function more than the minimal clinically important difference (MCID, Oswestry=1515, NDI=9.514) and both scores decreased over 50%. The figures below represent the data collected from the Sheehan

Disability Scale in the experimental and control phases of treatment. The dates of treatment are located on the x-axis and the results of the day's measures are plotted on the y-axis. The rate of improvement is the slope. By looking at the slope, a trend, or direction of change, can be seen in the data.

Figure 1. Hippotherapy Plus Traditional Physical Therapy, measure of disability and impairment. Data measured using the Sheehan Disability Scale.

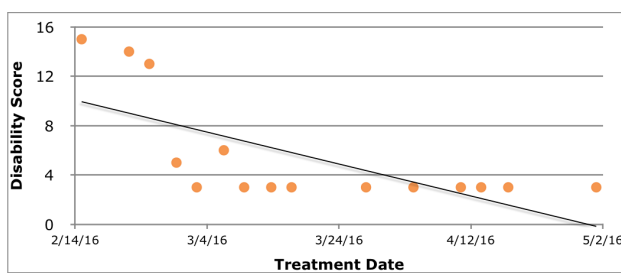
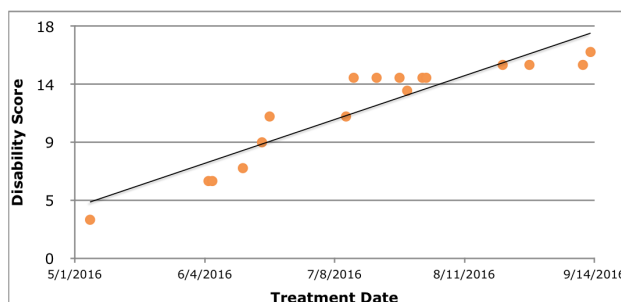


Figure 2. Traditional Physical Therapy only, measure of disability and impairment. Data measured using the Sheehan Disability Scale.



Discussion

The subject showed a greater response to hippotherapy combined with traditional therapy than to traditional therapy alone. While he was a compliant patient, he became disappointed when the horse was withdrawn and required strong encouragement to complete the data in the Treatment B of the program. The traditional physical therapy treatments were comparable during both experimental and control sessions. After completion of the control data, the subject eagerly returned to hippotherapy treatment. Thus, while hippotherapy produced effects that could be sustained over time, in this case the decreased motivation and eagerness of participation and other external factors may have played a role in increasing disability levels during the control portion of the program.^{4,5,16} Among other factors, the subject was a

university student whose course load varied between the two semesters and who experienced external stressors during the last half of the program due to family dynamics. His enthusiasm for horse-based therapy suggests that he would have responded well to hippotherapy alone, but he also demonstrated more willing participation in traditional therapy when combined with hippotherapy.

While single-case design studies provide rich data, several limitations should be noted. The small sample size did not allow the results to be applied as freely to larger populations. The Hippotherapy Program treated a wide variety of diagnoses, which also limited the ability to aggregate data and generalise conclusions. Power was limited in the statistical data secondary to single case design. Despite the low power, both statistically significant and clinically relevant improvements were demonstrated in an individual case. Determining confounding factors is difficult in this study. Exclusion bias exists as there are several exclusion criteria due to using the equine center. Selection bias exists as subjects are primarily referred from the Beck Pride Center.

The Beck Pride Center was established in 2007 at Arkansas State University. Services offered by the center were designed to fill gaps in an underserved area and supplement, not duplicate, existing government benefits while providing support for United States Veterans returning from service and entering higher education. Examples of services provided at little or no cost include physical rehabilitation, mental health counselling, advocacy, benefit assistance, and career or vocational development.

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Conclusion

The subject reported decreased disability with low back pain, decreased neck pain, and disappearance of stuttering following hippotherapy sessions. This evidence suggests that hippotherapy may result in physical benefits for some veterans. Hippotherapy has the potential to restore, maintain, and promote

physical function as well as quality of life in aspects of disability, in some individuals. Further research is indicated.

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