

**A critical appraisal of “Effects of horse riding simulator on sitting motor function in children with spastic cerebral palsy”**

**By**

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**Abstract**

The clinical question for the paper was can a horse riding simulator improve balance in children with cerebral palsy. This article chosen for this critical appraisal is “Effects of horse riding simulator on sitting motor function in children with spastic cerebral palsy.” Each section of the research article was analyzed for its strengths and weaknesses and evaluated for credibility. Overall, the study was credible and no major red flags were discovered. There were some minor issues but the majority of the article was written in a clear and logical fashion. The authors did their best to eliminate bias where they could, accurately interpreted their results in the discussion and acknowledged limitations to their study. The two biggest issues with the appraised paper were small organizational problems in the introduction that made it mildly confusing to read and difficult to understand tables. The results of the study support the implementation of HRS into standard treatment for children with spastic cerebral palsy and did not show any significant risks associated with the treatment. At the time of the appraisal, not much research has been done this intervention and further studies are need to determine just how effective (or non-effective) it is for improving balance in children with cerebral palsy.

**Key words**

Hippotherapy, Cerebral Palsy, Children, Horse Riding Simulator, Balance

## **Introduction**

Credible research and research articles are critical to advancing our current base of knowledge and keeping treatment as up to date as possible. It is just as important for an individual to be able to analyze and appraise an article for credibility. The purpose of this critical appraisal is to analyze an article about the use of a HRS for treatment of CP. Cerebral palsy is a condition that starts in childhood and can cause impairments in balance and muscle coordination and requires early intervention. The article will be evaluated for credibility and clarity. Young children are less likely to participate in standard therapy so more “fun” alternatives are needed to keep them interested. Hippotherapy would be a more “fun” way to train balance but may not be accessible to all patients. Children may be afraid of horses or there may not be a facility near by that offers hippotherapy. HRS can be used as a substitute for hippotherapy and still be more entertaining for children than standard physical therapy. The clinical question for this critical appraisal is: can a horse riding simulator improve balance in children with cerebral palsy?

## **Methods**

The database SPORTDisucs with Full Text was initially searched with the keywords cerebral palsy, children, hippotherapy and balance. After some searching, the key word hippotherapy was changed to horse riding simulator since HRS would be more accessible to patients and therefor have a greater chance of being implemented if the intervention worked. The articles examined were narrowed to peer reviewed journals and primary source articles. These limitations where placed to filter for more reputable articles and to filter out literature review articles. Only free, publicly available articles were looked at to save money. A limitation was also

set for articles published after 2000 to ensure the results of the search provided recent and up to date articles. Not much research has been done on this specific topic so only 4 hits were found before articles started to be reviewed.

This study was published in the journal *Physiotherapy Research International* and was conducted in Tamil Nadu, India by authors Hemachithra Chinniah, Meena Natarajan, Ramanathan Ramanathan and John William Felix Ambrose. All authors are associated with Annamalai University but their titles are not mentioned. The article was published in 2020. After a quick review the article seemed to be the most reliable of articles found. It was also one of the only reviewed that had both an experimental and control group. The assessor in this study was blinded to the group placement of participant being assessed. This was not the case in many of the other studies reviewed and was an additional reason why this article was chosen for appraisal.

## **Results**

### *Summary of the study*

This was a RCT involving 36 children with spastic CP investigating the effects of horse riding simulator (HRS) combined with standard physiotherapy on postural and sitting motor function. There are many different kinds of CP but this study focused specifically on spastic CP. The authors cited sources stating that the rhythmic movements of horse riding can help to strengthen postural muscles which improves balance. As such, the researchers wanted to investigate if HRS would be beneficial to those with spastic CP. Subjects were evaluated at baseline, 4, 8 and 12 weeks with the control group receiving conventional physiotherapy and the

experimental group receiving conventional physiotherapy along with 15 minutes sessions on a HRS three times a week. The experimental group showed significant improvement over the control group at the 4, 8 and 12 week checkpoints. This suggests that adding HRS to treatment for children with spastic CP will lead to better postural and sitting motor control.

### *Appraisal of the study introduction*

The introduction thoroughly explained and justified the use of hippotherapy for treating postural/balance deficits. Several credible sources were given for the claims made about the use and benefits of hippotherapy. What HRS is and its benefits as an alternative to horse riding were explained. The authors provided sufficient evidence that HRS is similar enough to horse back riding to produce the same improvements in postural control. In-depth background was given for CP and its symptoms. It was acknowledged that there are many types of CP and this study was only looking at spastic CP. The authors justified the necessity of their study and noted not much research had been done on this specific intervention for spastic CP. The outcome measure was explained in the introduction. The authors clearly stated the aim of the study at the end. The introduction was clearly written and the authors gave background on complex information in a way that was easy to understand.

Thorough and adequate background information was given but the organization of topics was a little confusing. The introduction jumped from background information about hippotherapy, then CP and lastly HRS. The alternative intervention of HRS should have come after the introduction of hippotherapy to improve clarity. The introduction would flow better if justification of HRS came after the discussion of hippotherapy then concluded with a discussion

of CP, or start with CP then move onto the benefits of hippotherapy and lastly, why HRS is a reasonable substitute.

### *Appraisal of the study methods*

The authors performed an experimental RCT study with 18 participants in both the control and experimental groups. It was a prospective and longitudinal study with outcome measurements taken at baseline, 4, 8 and 12 weeks. The therapist performing the assessments was blinded to group placement of the subjects and to what time interval the assessment was taking place at. Treatment was performed by qualified pediatric physical therapists. The outcome measure used was clearly stated and a source was provided on its reliability and validity. The control and experimental groups were treated the same way except for the experimental variable. The methods were described well enough to be repeated by others. The specific model of HRS used in the study was given as well as the speed setting used and the criteria for progression of speed setting through out treatment.

The therapists providing treatment and the subjects receiving treatment were not blinded to group placement. In total 6 subjects dropped out of the study for personal reasons, illness or refusal to cooperate. Each group ended the study with only 15 subjects. This small of a sample size might not be enough to get clinically significant results. Most factors were the same between to two groups, however, the experimental group had a larger number of younger children. The authors insist this was coincidental and does not skew their results since the age range analyzed was small (2-4 years old).

### *Appraisal of the study results*

The research question was appropriately addressed in the results section and all outcome measures were reported. Both the control treatment (standard physical therapy) and the experimental treatment (standard physical therapy with HRS) were statistically significant. The significance value was set as  $p < 0.05$ . Though the experimental and control groups were significant to the same value ( $p < 0.001$ ), the experimental group did have overall greater improvement in the raw score. Therefore, I would consider both groups to also be clinically significant. The results section was written in a clear and logical manner.

There was no mention of what the smallest statistically significant group size would be so it is unknown if the authors had enough participants to get reliable results. Confidence intervals of the data were not given. Minimal clinically important difference (MCID) and number needed to treat (NNT) were also not given. Some of the tables were laid out in a confusing way and it was difficult to determine what information they were trying to convey. Both the experimental and control groups were significant to the same value ( $p < 0.001$ ). Since both groups received standard physical therapy, it is difficult to say whether the improvement in the experimental group is due to HRS or standard physical therapy. The authors should have better differentiated the improvements due to physical therapy alone and the improvements due to HRS.

### *Appraisal of the study discussion*

The authors state HRS is clinically significant and should be mandatory in the treatment of children with CP. The experimental group did show greater than improvement than the control group. The results support the authors conclusion that HRS should be implemented into CP

treatment. The authors related the finding to other relevant studies. The studies cited all seemed to be from credible journals. Limitations of the study were acknowledged and reasonable future studies were suggested based on these limitations. Several clinical implications of the findings were given.

Though clinical implications and limitations were given, most of the conclusion was repeating information from the rest of the article. The results were not elaborated on much just restated and much of the introductory information was also repeated. There are many different types of CP and the participants in the study only had spastic CP, were very young (2-4 years old) and had mild disability. The severity and symptoms of CP are far ranging so the results of this study could only be applied to a small portion of children with CP. A final limitation is that only balance/postural control was assessed. The effects of HRS on other symptoms of CP (muscle strength, spasticity, etc.) were not analyzed.

## **Discussion**

The horse riding simulator group showed significant improvement over the control group indicating the treatment was effective. If other studies agree that HSR therapy shows better improvements than the current standard care then it should be implemented into practice to give patients better results. Studies like this one could convince clinics that work with children who have spastic CP that a HRS is a worthy investment. The subjects showed no adverse effects of the treatment. If implemented, more effective therapy would be provided in an accessible manner with little to no risk. It would also make physical therapy a more enjoyable experience



for children. The results of this study suggest yes to the clinical question mentioned in the introduction of this paper.

HRS was deemed clinically significant and no adverse effects to treatment were recorded. All subject attrition was due to refusal to cooperate, illness or personal reasons and not due to effects of the proposed intervention. With no documented adverse reactions, the benefits of the appraised intervention greatly outweigh the risk so I feel it would be safe to recommend to patients. Even if the intervention did not help the patient improve much than standard treatment, it will not harm them either and would be more enjoyable. Stronger evidence and more research on the topic would help the argument in favor of the proposed intervention. Long term studies would show the long term benefits of this intervention and provide more evidence for its efficacy.

I am confident in this article's credibility and would recommend it to patients if they were interested. However, more research would need to be done before I would make it a standard part of treatment. I would look to see if similar studies agree or disagree with the conclusion of this article. I wouldn't want to risk wasting a patient's valuable time during therapy based off one article with no other evidence to back up my practice. Of course, additional equipment would have to be purchased to perform HRS so enough patients would have to be interested to justify the cost of equipment.

Overall, this article has high credibility. The authors were very thorough in their design and in detailing it in the article. They eliminated bias where they could and had qualified physical therapists administer treatment and evaluate the participants. The article as a whole had

excellent organization ( just very minor organizational issues in the introduction) and was written clearly. In my view the article is reliable and I would feel comfortable using this intervention in the clinic but would also want to do more research to verify that the conclusion of this study has been replicated and supported (or not supported) by other articles.