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## Use of horse riding in chronic pain therapy

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**Abstract:**

**Introduction and purpose:** Chronic pain is a struggle itself and also a symptom in many common conditions. Its complexity requires diverse treatment methods including some that might seem unconventional, for example, horse riding. This study gathers information about the use of equine assisted therapy in pain relief.

**Brief description of the state of knowledge:** Hippotherapy is known as an important part of care for patients with cerebral palsy, attention deficit and autism. The rhythmical, multidimensional movements of the horse are transmitted to the rider's pelvis and help in strengthening and stretching the muscles which result in better posture stabilization and balance. The positive effects of equine assisted therapy are not limited to only physical ones but positive social, cognitive and psychological effects can be observed as well. In order to lower the cost and time of the therapy, horse riding simulators were invented. So far, horse riding has been tested as a pain relief tool in entities like nonspecific low back pain, multiple sclerosis and arthritis.

**Summary:** Horse riding sessions had beneficial effects on pain levels among patients with nonspecific back pain and arthritis. There is a need to conduct further research in order to properly compare the use of real horses versus horse simulators. Hippotherapy was well perceived by different patient groups so maybe it has potential to be an important part of pain management in various conditions.

**Key words:** horse riding; equine assisted therapy; hippotherapy; chronic pain

**Introduction**

Globally 20% of people suffer from chronic pain [1]. In some subgroups of population even up to 40% of people struggle with this problem [2]. It is one of the most common issues

resulting in seeking medical help. It may seem less life-threatening than cardiac arrest, stroke or cancer but it can make the patient's life unbearable [3]. Chronic pain conditions rank in the top 10 roots of disability [4]. Just in the United States of America the costs of chronic pain, which include healthcare, sick leaves, disability allowances are estimated to be \$560 billion yearly [2]. The consequences are visible not only in people's everyday life, but also in national healthcare systems. Although the case of chronic pain is broadly researched- 19,745 results on PubMed within the last 10 years, we still have many patients in need of help [2,5]. Besides pharmacotherapy, physical exercise is commonly used as a part of pain management. Its effectiveness varies depending on the type of exercise, pain source and main component [6]. Among many other approaches, the role of horse riding has been investigated as a possibly beneficial part of chronic pain therapy [7].

### **Aim**

The aim of this study is to gather and analyse the studies about the use of horse riding (real horses and horse simulators) in treatment of patients suffering from chronic pain.

### **Methods**

Freely accessible databases such as Pubmed, Google Scholar were searched using the keywords: 'horse riding', 'horse simulator', 'equine assisted therapy', 'hippotherapy' and 'chronic pain'. Articles were furtherly chosen based on title, next abstract. Finally, those connected to pain treatment, written in English and published between 1990 and 2023 were included in the study.

### **Chronic pain**

The differentiation between acute and chronic pain is usually placed somewhere about a 12-week duration period and tissue healing time [8]. Pain accompanies lots of chronic conditions from arthritis, fibromyalgia, irritable bowel syndrome to headaches and many, many more [3,6]. Chronic pain has not only a biological component but also its psychological and social part [9] so the quality of life and patients' overall functioning should be a standard part of chronic pain assessment [10]. Recently, it has been advocated to indicate chronic pain as its own disease entity rather than a result of other clinical conditions [3,11]. This approach

usually means dividing chronic pain into ‘primary’ when it is the main concern and ‘secondary’ while being a symptom assisting other diseases [7]. As stated previously pain is a part of many chronic diseases [3,6] however this study focuses on conditions where horse riding was tested as a pain management tool.

### **Back pain**

The top musculoskeletal disorder with high social and financial influence, affecting up to 59% of patients during their lifetime is low back pain. A sedentary lifestyle, which is now a standard for many, decrease in muscle mass, that is natural for ageing, additionally the lack of regular physical activity- these factors contribute to making the low back pain an everyday problem for a huge number of adults [12]. Nonspecific low back pain being the most common type is a result of multiple attributes i.e. segmental instability, disk degeneration, muscle weakness, abnormalities in posture [13]. Because the need to remain in balance while horseback riding requires activation of postural control, this activity is believed to strengthen the muscles which then restore the trunk stabilization and improve the spinal balance, furtherly relieving pain as well [14,15].

### **Multiple sclerosis**

Patients with multiple sclerosis struggle with muscles stiffness, spasms, feelings of numbness, difficulty with coordination and balance [16]. Suggestions of benefits of hippotherapy among multiple sclerosis patients emerged in the late 70s and since then have been examined multiple times by researchers, because there is still a gap between patients’ needs and available control of the symptoms [17].

### **Arthritis**

Osteoarthritis, popularly known as a degenerative joint disease due to the destruction of the cartilage, is a common and rising problem worldwide due to an ageing population and increased obesity prevalence. It is associated with pain, stiffness, swelling and reduction of functionality. In addition to standard pharmacological intervention physical activity is highly recommended as an important part of the care plan [18,19]. Horse riding in therapy of arthritis seems promising, since it provides the movement of the joints with less weight load which reduces the joint damage [18].

## Horse riding

Hippotherapy started as a potential therapy supplementation for patients with cerebral palsy, attention deficit, autism and geriatric population [7]. The rhythmic gait of the horse is a repetitive sensory and motor stimulation that can mimic the movement of the pelvis during walking [20]. During horseback riding the multidimensional movements of the animal are transmitted to the rider's pelvis and spine expanding the movement range, strengthening the core muscles and improving stabilization and balance [13,18, 21]. It showed a positive effect not only on physical area but social, cognitive and psychological too [20,22]. Equine assisted therapy (EAT) is usually very well perceived by patients, they engage in the process, the compliance is higher. [20]. There are even indications that hippotherapy might impact hormone levels, increasing serotonin and decreasing cortisol [22]. It was tested in a broad number of conditions including those that at first do not seem applicable, but did show interesting results in the end, for example after stroke rehabilitation [23], insulin sensitivity improvement in elderly diabetics [24], prevention of falls in geriatrics [25].

However, there are still some downsides to manage while offering equine assisted therapy. The living, big animals are expensive to feed, train and look after. They require conditions, that cannot be provided in the city, so hippotherapy appointments take a lot of time for most people to arrive to. Harsh weather, allergies, possible accidents, and anxiety to ride a horse might also be difficult to overcome. As a response to those arguments horse riding simulators have been created. They can be placed in a room anywhere and used without the need for rest, like a real horse requires [7].



**Figure 1. The MiraColt™- mechanical horse riding simulator from Chariot Innovations, Inc. [26]**

Nevertheless, the connections made with a real animal give additional biopsychosocial benefits: an increase in self-esteem and self-control, while the stimulators only provide the physical part of the treatment. [7,22].

Over the years terminology associated with the use of horses as a part of therapy in various conditions evolved. Besides hippotherapy, we can encounter terms like equine assisted therapy, activities or therapeutic riding and some more which are very similar to the above. There are no standardizations as to how they differ and what exactly they include. The American Hippotherapy Association issued its recommended terminology which excludes 'equine assisted therapy' [27] whereas the Professional Association of Therapeutic Horsemanship International uses it broadly [28]. Scientific articles usually do not get into analysing the nomenclature and various titles are used [7,20,29].

## **Results**

Starting with the oldest study found during described research Håkanson et al. in 2009 analysed notes, letters, Visual Analogue Scales (VAS) and videotapes of patients with low back pain taking part in horse riding lessons. There were contradictory findings in VAS for pain intensity but the duration of pain decreased, the relief of pain periods were present and some descriptions of feelings of joy connected to EAT were found [30].

In 2014 Oh et al. and Yoo et al. conducted a study using horse simulator sessions in therapy for chronic low back pain patients. They investigated the changes on VAS for 15 modalities of pain: back pain, night pain, exercise, drug relief, stiffness, walking freedom, walking discomfort, standing still, twisting, hard chair, soft chair, lying down, handicap, work interference, work modification [31,32]. Detailed results are presented in Table 1. In most cases, the changes in the horse simulator therapy group were significant ( $p < 0,05$ ).

**Table 1. Changes in VAS after horse simulator sessions for patients with chronic low back pain.**

| Modality           | Oh et al. 2014 [31]     | Yoo et al. 2014 [32]    |
|--------------------|-------------------------|-------------------------|
| back pain          | significant decrease    | significant decrease    |
| night pain         | significant decrease    | significant decrease    |
| exercise           | significant decrease    | nonsignificant decrease |
| drug relief        | nonsignificant decrease | significant decrease    |
| stiffness          | significant decrease    | nonsignificant decrease |
| walking freedom    | significant decrease    | significant decrease    |
| walking discomfort | significant decrease    | significant decrease    |
| standing still     | significant decrease    | significant decrease    |
| twisting           | significant decrease    | significant decrease    |
| hard chair         | significant decrease    | significant decrease    |
| soft chair         | significant decrease    | nonsignificant decrease |
| lying down         | significant decrease    | nonsignificant decrease |
| handicap           | significant decrease    | significant decrease    |
| work interference  | significant decrease    | significant decrease    |
| work modification  | significant decrease    | nonsignificant decrease |

Another study using a horse simulator in low back pain therapy was carried out in 2016 by Chen et al. It revealed significant within-group differences in VAS for the horse simulator group. There were no significant between-group differences when a comparison to the control group, which performed lumbar strengthening exercises, was made. The authors suggested the horse simulator sessions as a more convenient (than hippotherapy) and motivating (than conventional exercises) way of treatment management for patients with nonspecific chronic low back pain [15].

Rahbar et al. in 2018 showed that riding simulator patients benefited from the sessions when their low back pain intensity was measured and analysed [13].

In 2019 Vermöhlen et al. proposed hippotherapy on real horses for patients with multiple sclerosis. In contrast to other studies concerning the topic, their intervention group did not result in a significant decrease in pain compared to the control group. However, both groups did record lower points in VAS during observation [17].

Patients with arthritis were approached and examined by White-Lewis et al. in 2019. Equine assisted therapy sessions in certified centers helped to significantly decrease VAS pain scores for back, hip, and shoulder. When compared to the control group, which was given exercise education, changes between groups reached  $p < 0,05$  only for back pain [18].

The Numerical Rating Scale (NRS) for average pain intensity was used to assess low back pain experienced by patients divided into a horse simulator group and a stabilization exercise group in the Kim et al. study in 2020. The within-group analysis proved significant differences in NRS pain scores but nonsignificant results for between-group comparison [14].

Park et al. in 2020 conducted a randomized controlled trial dividing elderly women with low back pain into a horse simulator group and a control group in which the participants were sitting on the stimulator without any movement of the machine. The study showed a significant decrease in VAS for pain after horse simulation sessions [12].

Two meta-analyses concerning the topic were found during the research. One by Collado-Mateo et al. in 2020 and the other by Ren et al. in 2021. Both examine chronic low back pain condition. Change-from-baseline outcomes proved positive effects of horse simulators on pain relief compared with control groups getting different treatment [7,21]. However, in the Collado-Mateo study the postintervention measures resulted in  $p = 0.06$ . They also tried to analyse interventions with real horses but the amount of data was insufficient [7].

A general summary of the findings from the mentioned studies is presented in Table 2.

**Table 2. Studies on horse riding as a pain relief tool.**

| The study                 | Patients' condition | Type of treatment | Results   | Other comments   |
|---------------------------|---------------------|-------------------|---|------------------|
| Håkanson et al. 2009 [30] | back pain           | real horse        | contradictory findings in VAS for pain intensity, decrease in pain duration, present pain relief periods                                | no control group |
| Oh et al. 2014 [31]       | back pain           | simulator         | significant decrease in pain concerning many situations types such as night pain, stiffness, work interference, standing still and more | see Table 1.     |
| Yoo et al.                | back pain           | simulator         | significant decrease in VAS for pain  | see Table 1.     |

|                               |                    |                               |   |  |
|-------------------------------|--------------------|-------------------------------|---|--|
| 2014 [32]                     |                    |                               | in various modalities   |  |
| Chen et al.<br>2016 [15]      | back pain          | simulator                     | significant within-group differences in VAS for pain in the horse riding simulator group, nonsignificant between-group differences (the control group performed lumbar strengthening exercises) |  |
| Rahbar et al. 2018 [13]       | back pain          | simulator                     | improvement in pain intensity   |  |
| Vermöhlen et al. 2019 [17]    | multiple sclerosis | real horse                    | nonsignificant between-group differences, but both the control and intervention groups resulted in lower points in VAS  |  |
| White-Lewis et al. 2019 [18]  | arthritis          | real horse                    | significant within-group differences in VAS pain scores for back, hip, and shoulder; between-group only for back pain   |  |
| Collado-Mateo et al. 2020 [7] | back pain          | both real horse and simulator | change-from-baseline analysis: significant effect of horse simulators on pain relief compared with control groups, postintervention measures: insignificant difference                          | systematic review meta-analysis, too few studies with real horses to analyse |
| Kim et al. 2020 [14]          | back pain          | simulator                     | NRS for pain significant within-group differences, nonsignificant between-group   |  |
| Park et al. 2020 [12]         | back pain          | simulator                     | significant decrease in VAS for pain after horse simulation sessions  |  |
| Ren et al. 2021 [21]          | back pain          | simulator                     | change-from-baseline analysis: significant effect of horse simulators on pain relief compared with control groups   | meta-analysis  |

## **Discussion**

These eleven publications presented in this review provide evidence for serious consideration of the regular use of hippotherapy in pain management for patients with chronic pain. Although the articles did show promising results they are not free of limitations which should be remembered while analysing the data. The majority of people in the investigated groups had problems with low back pain but unfortunately, the researchers did not always describe the participants' other conditions. We should be aware of the possible overlap of different causes of back pain. In addition, the heterogeneity of the population was high -different sex, age, race and not analysed thoroughly which might have had an impact on the results [7]. The group numbers in the trials did not exceed 100 participants and were often much smaller[21]. This provides little samples for investigation. A single study lacked a control group in its design [30] the rest had a control group with various variables. The risk of bias is also not possible to exclude.

Chronic pain is a complex biopsychological disorder. During EAT with real animals, there is a possibility of creating some positive emotional connections that may influence the experience of pain. The effects might be not only physical but also social and psychological [7,9,22]. The primary therapeutical target of moving, strengthening, stretching and stabilizing the muscles and improving the posture can be provided by machine simulators as well [13,18,20,21], assuming they can mimic properly the natural gait of the horse. However, using simulators doesn't allow the patient to experience the warm temperature of the horse, the presence of multiple animals in riding centers or the possibility to pet and connect with the real horse while riding. On the other hand, during simulators usage the risk of accidents is lowered to a minimum, and the time required for the logistics of the therapy can also be decreased. Unfortunately, to the authors' knowledge, there is not enough data to assess how all those variables influence the outcomes of the treatment.

## **Conclusion**

Whenever it is a primary concern or a symptom in many conditions, horse riding sessions with both real horses and artificial simulators are recommended to be considered as a part of the multimodal treatment required for patients suffering from chronic pain. Horse riding shows potential in helping with nonspecific back pain, arthritis, and presumably multiple

sclerosis. Other conditions with chronic pain component might be investigated with positive results as well. It is also encouraged to conduct more studies especially to be able to make the comparison between the effects of hippotherapy using real animals and artificial simulators.

### **Authors contributions**

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The authors report no conflict of interest.

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