2025

Topic: Osteopathy in dressage sport horses

Question: How can equine osteopathy support dressage performance horses?

Thesis: Equine osteopathy can add performance and health benefits to dressage horses tailored to their specific needs

How can equine osteopathy support elite dressage horses

A REVIEW OF SPECIFIC INJURIES AND DYSFUNCTIONS INCURRED IN ELITE DRESSAGE HORSES AND HOW EQUINE OSTEOPATHY CAN TREAT AND POTENTIALLY REDUCE THEIR IMPACT

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1. Introduction

1.1 Equine osteopathy is emerging and critical field of study and practice

Although Pusey et al (2011) reference Hippocrates as the first record of osteopathy ("rubbing"), it was not until the 1880s that Dr. Andrew Taylor Still formalised the principles of osteopathy for humans, which still hold today. The study and practice of animal osteopathy – including for equines – originated in the 1980s with McGregor and has since been globally recognised. However, various systematic reviews of research (Hausler et al, 2021, Atalaia et al, 2025) show that more availability of high quality reviews and clinical data for osteopathy is needed. The systematic reviews, meta-analyses and individual research efforts all evidence or argue wide-ranging benefits from mobilisation and manipulation showing across disciplines, horses and reported pain or mobility issues, However, the field is still growing. Although the benefits are clear, specific use cases and clinical evidence is still somehow limited. This is particularly true in the field of elite performance, and elite dressage performance, both of which are subjects of personal interest. It is argued in the research reviewed that osteopathic techniques can accelerate healing, restore health and wellbeing, support rehabilitation and even potentially prevent injury or reduce impact of injury. This research intends to explore the connections between osteopathy and elite dressage performance to understand more about which techniques may be relevant, at which time.

1.2 Why is osteopathy relevant to dressage in particular?

Given that equine osteopaths can support all of the body systems of the horse, from increasing gait regularity and range of motion through manipulation of muscular and skeletal structures, to reducing the occurrence of injury through improving balance in the motor systems and soft tissue health, to promoting fluid dynamics and thereby health across the

respiratory, nervous and circulatory systems, it stands to reason that all sport horses in all disciplines can benefit. However Hausler et al's (2021) review, cites few examples of osteopathic research on dressage horses.

The evaluation of dressage horse performances has specific standards, different to those in showjumping and polo, for example. As laid out in the German cavalry manual (Heerediensvorschift, or HDV) in 1935 and since canonised in all of the major international dressage federations, dressage horses shall demonstrate six scales of training; rhythm, relaxation, contact, impulsion, straightness and collection. One study concludes that symmetrical pelvic movements across gaits in high level dressage horses is a strong predictor of higher scores (Hobbs et al, 2023), reinforcing the importance of balance and mobility in dressage in particular.

Perhaps because of the above, the takeup of medical and therapeutic interventions supporting dressage performance is significant. This is particularly the case with Complementary and Alternative Medicines, where one study found that osteopathy was used in over 50% of the 222 cases of Swiss Warmbloods with back problems or lameness, with a prevalence towards treating back problems. Beyond osteopathy, riders and owners are clearly investing in preventative and restorative therapies to enhance performance of their sports horses, as evidenced by the growth of the current medical therapy and device market globally to USD1,572.5m (Future Market Insight, 2025) and includes medical therapeutic devices, including lasers, red light therapies, magnetic therapies and PEMF devices. Many dressage horses use a wide combination of the above to achieve and stay at the top levels of performance.

Where then does equine osteopathy fit in? How can it further enhance performance of dressage horses in the achievement of the six scales of training? This paper hypothesises that

getting to, and staying at, elite levels of dressage performance can be assisted through specific osteopathic interventions.

1.3 The purpose of this paper

The paper will focus on three areas of investigation; 1) how can osteopathy benefit sports horses in general, 2) what are the specific needs of dressage horses and 3) how can osteopathy assess and treat these.

A literature review has been conducted through Google Scholar and textbooks on the LCAO course materials to identify 44 of the most relevant papers, articles and books. Searches were conducted to reveal

- existing research on the particular needs or challenges of sports and performance horses
- existing cases of osteopathic research on dressage horses
- reviews on specific osteopathic techniques designed to support distinctive needs of dressage horses

Papers were visually assessed by title and summary to assess relevance. Initial searches were restricted to publications since 2020. When papers were read, more flexibility to dates was applied.

A summary of the literature reviewed and the findings can be found in Table A. Keyword searches are indicated above the table and relate to each of the three questions.

1.4 Conclusions

The research indicates that dressage horses do have distinctive patterns of injury and potential dysfunctions that can be assessed and treated by osteopathic interventions. Dressage horses

appear to be more prone to injury of the hindlimb suspensory ligament and to myofascial pain, particularly in the cervical region.

Treatments considered for the above include rehabilitation of the suspensory injury through mobilisation, tissue manipulation and overall OAB approaches. Myofascial release techniques are explored for the specific trigger points identified in dressage performance horses. The research also indicates that regular osteopathy can support the stabilising systems of the horse, thereby potentially reducing the likelihood or severity of injury.

Limitations include a lack of research connecting dressage performance horses and OAB and/or myofascial trigger point release approaches, a lack of consistency in the timing and application of both approaches, as well as whether they are used in combination with other therapies, where the literature shows that combinations of approaches are the most effective protocols. There are also no known control groups of significant sizes to provide clarity as it relates to prevention or enhanced performance.

Nonetheless, osteopathic techniques are argued to be effective in promoting performance, particularly for the health, rehabilitation and performance of performance dressage horses. Further research is warranted to explore links to performance, as well as to amass appropriate sample sizes and groups to assess evidence empirically.

2. **How can osteopathy benefit sport horses in general?**

2.1. General benefits of osteopathy for sport horses

Osteopathy, by principle, helps humans (and animals) to perform and to recover by restoring balance at all levels of the living body as a system, which then enables health or the restoration of health across the body. Although originally developed for the humans by Dr.

Taylor Still - not satisfied with the limitations of traditional medicinal approaches - the principles of osteopathy have more recently been applied to horses and other animals. As horses cannot tell us what is wrong beyond a visible/acute injury, we can argue that many osteopathic techniques are even better suited for horses than they are for humans, given that they allow us to consider the whole unit of the horse's body, conformation, ranges of motion, the interplay between the neurological, arterial and muscularskeletal systems whilst still and moving. By holistically understanding the horse at all of these levels, osteopaths can treat the body and mind, allowing it to restore itself to good health. Because the techniques are also non-invasive and facilitate a positive human to animal connection, not only can they contribute to a horse's sense of wellbeing, they require much less, if any, recovery periods post technique. For example, we may be able to achieve the same mobilisation of a limb through myofascial release and movement in the direction of ease of motion, rather than needing to apply brute force against the direction of range of motion, such as we do with chiropractic techniques.

Given these principles and techniques, it is clear that equine osteopathy has supported sports and performance horses at the top of their sport. Osteopathy can not only restore flexibility and range of motion, thereby improving immediate performance, it can also correct compensatory strategies that horses may develop through periods of strain or unbalance. The benefits for sport horses are well documented, with Ramon et al (2025), demonstrating the benefits of even one osteopathic manipulation of a SIJ dysfunction in reducing back pain for up to 15 days, and improving gait symmetry and hoof ground clearance in polo ponies.

2.2. Are dressage horses different in terms of their needs or potential dysfunctions?

Research also shows that sports and performance horses can easily fall victim to both acute injuries but also chronic injuries as a result of excessive demand on their bodies over time.

Schumacher (2024) shows how polo ponies are predisposed to overall lameness, with Pfau et al (2016) showing a predisposition towards gait asymmetry in polo ponies. These injuries can be connected to the requirements of polo, including sharp turns, sharp transitions, irregular movements at pace whilst chasing the ball or riding off and colliding with other horses and riders.

Advanced dressage movements such as pirouettes, passage and piaffe require significant load bearing on the hind limbs. Pirouettes in particular require not only load bearing on the hinds, but also rotation around the quarters. Balance and strength are both required not only in the pelvic and hindlimb muscles and joints which act as stabilisers as the body and shoulders rotate around the inside hind leg, but also along the longissimus dorsi and braciocepahlic muscles as they lift and rotate around the hind limbs. Advanced dressage movements such as tempi changes and half passes also place strain on the dressage horse, across the joints when extensively using lateral movements, across the lumbar sacral and SI joint regions when correctly executing tempi changes initiated from the pelvic region and in the braciocephalic and lower cervical regions as bend and flexion in the neck is required for long periods of time. Advanced dressage movements such as extensions, when correctly executed, also place substantial demands on the hindlimbs and pelvis, where “push” is required for the horse to extend in front.

Not only do the above movements put clear strain on the dressage horse when correctly executed, but when horses lack the underlying strength or training or the rider cannot for any reason enable the movements to be ridden correctly, even more strain occurs. Von Borstel et al (2009) show how some techniques such as coercively obtained, can cause many signs of

distress in dressage horses, including tail swishing, head-shaking, bucking and gait abnormalities. Manolo Mendez argues that riding a pirouette with the neck too short and nose behind the vertical "*destroys horses' long back muscles, their pelvic attachments, the joints, tendons and suspensory ligaments".* Giacomini (2017) addresses the absence of lightness in collection in dressage, arguing that this is linked to many accidents in top dressage horses, substantial enough to require 2-3 year recovery periods and *"…can only come from mechanical wear and tear created by the constant tension of spasmodic muscles. This is generally the effect of working a horse for too long in asymmetrical, unbalanced equilibria, or under constant constraints that maintain the horse in a position he cannot handle safely for long."*

The above indicates that dressage horses may be at risk of specific strains and injuries resulting from those strains, both as a consequence of correct and incorrect approaches to the high-level movements.

3. Myofascial dysfunction and hindlimb injuries in dressage horses

3.1 Dressage horses show distinctive patterns of both injury and dysfunction

In the academic literature, performance dressage horses appear to be subject to two distinctive types of dysfunction and injury; hindlimb suspensory injuries and cervical myofascial trigger pain. Portier et al (2025) show that dressage horses have a higher number of myofascial trigger points than showjumping horses. Both showjumpers and dressage horses recorded the highest number of points in the back, dressage horses found more triggers in the neck and more triggers overall. Myofascial pain syndrome resulting from these abnormalities, indicated by positive responses to trigger points, can lead to low performance, lameness and pain. Importantly, myofascial pain syndrome has been researched in the context

of non-lame horses, suggesting that myofascial pain syndrome can be experienced by dressage performance horses whilst in competition work, limiting performance rather than requiring time off. Moving from dysfunction to eventual injury, Kold and Dyson (2003) assert that dressage horses are more at risk of suspensory ligament issues than other non-performance horses.

3.2 Myofascial trigger points: definition, location and causes

With myofascial trigger points, we focus on the muscles of the horse – both tonic and phasic – which have contracted, but have not returned to the expected shape and elasticity after contracting. This contracted muscle will have reduced blood and lymph flow and reduced motion. In this state, the muscle becomes hypertonic and impacts the area's range of motion. Although trigger points have been studied for over 50 years, there is ongoing debate about their origin. Travell (1992), McPartland (2002, 2005) and Niel-Asher (2005) describe the evolution of thinking on the cause of myofascial trigger points, with McPartland (2005) focusing on the motor end plate, where either pre-synaptic (as argued by Travell) or at any time in the synaptic processes, there is an excessive release of acetylcholine (ACh) from the terminal into the synaptic cleft, where it activates nicotinic ACh receptors (nAChRs) on the post-synaptic muscle membrane, leading to an action potential.

Once formed, the trigger point is a *"hyperirritable locus within a taut band of skeletal muscle, located in the muscular tissue and/or its associated fascia",* (Travell, 1992). The trigger points when stimulated can cause pain in specific patterns away from the initial source. These patterns are explored in many manuals in humans. Broadhurst (2022) gives a detailed description of trigger points in horses and their referral patterns.

Portier et al (2025) identify 8 trigger points in the dressage horse. Common to both dressage and showjumping horses in their study are trigger points in the Trapezii Thoracis, Latissimus Dorsi, Longissimi Thoracis, Serratus Dorsalis and Longissimus Lumborum in the back. Common to both but more prevalent in showjumpers were trigger points in the Gluteus Medius. While showjumpers also presented trigger points in the dorsal part of the Braciocephalicus, these were not as present as in the dressage horses, who also had significant trigger points in the ventral part of the Braciocephalicus.

Broadhurst (2022) identifies four trigger points in the Braciocephalic muscle. The two upper ones – TP1 and TP2 - appear to be in the dorsal area identified by Portier et al (2025), refer to the ear and just behind the ear. TP3 and TP4 refer to the neck's caudolateral area, the cranial part of the shoulder and the humerus. Together, these trigger points can be caused by overloading in lateral flexion and overcollection amongst other causes.

Five trigger points are identified by Broadhurst in the Trapezii Thoracis, with the most likely corresponding trigger point to Portier et al's study to be TP5, referring across the thoracic region of the trapezius. Further along the back, Portier et al identify four triggers that are not explicitly researched by Broadhurst. The closest corresponding points could be Lat 2,3 and 4, in the Latissiumus Dorsi and VS 2 and 3, in the Ventral Serrate. These points are argued by Broadhurst to originate from rider asymmetry, poor saddle fit, schooling and conformation issues or repetitive concussive forces.

The Gluteus Medius has many trigger points in Broadhurst's work. The GL1 and MG1 and MG2 are visually closest to those identified in Portier's work. These are argued to be caused by overuse and overload injuries, sacroiliac joint dysfunction, disuse atrophy of the muscles of the stifle or even landing awkwardly after jumping. Whilst Portier et al identify only one trigger point, Broadhurst identifies several others, including for example Iliopsoas and Psoas

Minor trigger points. These may not be easily identifiable (nor treatable) by palpation, which could explain why these are not referenced by Portier et al, who used palpation as the primary identification approach.

3.2 Techniques to address myofascial trigger points

The literature offers a wide range of potential techniques to address trigger points. Broadhurst (2022), and Travell et al (1992) acknowledge osteopathic approaches as well as needling, taping, ridden stretches, injections, lasers and shock treatments. Osteopathic approaches can be clustered into three major groups; palpation-based approaches, muscle stretches and muscle group/joint activation approaches.

The act of palpation in itself can address trigger points. Palpation allows us to identify the trigger points and referring pain patterns. By drawing attention to the hypertonic area, palpation can also induce the horse to relax the area themselves. Ischemic compression can be used, where pressure is applied to the trigger point in a sustained manner until the trigger point dissipates. As described, ischemic compression is painful – it involves pressing forcefully on the painful trigger point for 30-90 seconds until the blood flow is temporarily cut off. When the pressure is released, the blood flow surges back (reperfusion) and can increase oxygen supply as well as the elimination of excess ACh. Reviews of ischemic compression are mixed, with Lu et al (2022) conducting a systematic review and a meta-analysis, where 11 studies and 427 patients reported positive effects post treatment, whereas 7 studies and 251 patients did not. Lu et al therefore argue that ischemic compression may rather increase pain tolerance at the trigger site. Other researchers including Niel Ahse argue that force is less needed – one can achieve the same benefits by touch and hold, rather than

force. Indeed, palpation and sustained light touch is used in the Pusey et al (2011) manual amongst others for areas identified for trigger points such as VS 2-3 and Lat 2-4.

The second cluster of techniques involve longitudinal and cross-fibre stretches of the specific muscles. As the practitioner is aware of the anatomy of the muscle, they can locate and affect either directly or indirectly the end plates that may need to be activated to release the trigger point. These stretches vary considerably, depending on the location of the trigger point. In the cervical region for example, the myofascia can be released by opening up the shortened side of the neck through sidebending and articulation/shallow movement of the cervical vertebrae, one by one. These stretches could be beneficial for TP1-4 as identified by Broadhurst. Isolating muscles in the back is hard given the anatomy of the back, hence palpation and touch techniques may be preferred. In contrast, many of the muscles in the gluteal region can be isolated and stretched/cross fibre stretched, although as Broadhurst indicates, there are more trigger points than can be palpated in this region, with end plates that are not directly accessible.

The third cluster of techniques involves stretching or mobilising regions. For the Thoracic Trapezii, Pusey et al (2011) describe the thoracic sling release, where the practitioner acts as a fulcrum and releases the whole of the thoracic sling apparatus over the front of the horse's forelimbs. This could potentially address the TP5 trigger point described by Portier and Broadhurst. Along the back, trigger points could be address either by palpation techniques as described above, or by oscillation approaches, either working down the vertebrae, or through the use of the tail to create movement along the back up to the neck. For the pelvic region, stretching the hamstrings and gluteal muscles using the hindlimbs can be effective in activating and thereby addressing the trigger points in this region. It stands to reason that

these bigger group stretches are made more effective when one increases the flow of fluid through the body, for example by articulating the lateral cartilages above each hoof.

3.3 Hindlimb suspensory injuries: causes and relevance

As hindlimb suspensory injuries are argued to be more prevalent in dressage horses, one may consider the strains and expectations particular to elite dressage to be related. This paper has reviewed the demands of pirouettes and tempi changes for example, showing that pirouettes may well cause injury, particularly if poorly executed, or executed on a poorly prepared horse. In general, the need for balance and lightness as the foundations for all elite dressage movements can be argued to predispose a performance horse to injury if they do not have sufficient strength or balance to perform the elite movements. Ridgway (2007) amongst others reminds the researcher of the importance of the chain of stabilising muscles throughout the body in reducing overall strain on the suspensory. Where this chain of stabilising muscle is compromised through atrophy, hypertonicity or tension, the impact can be suspensory injury. Ridgway amongst others therefore highlights how challenges such as poor saddle fit, vertebral irritation, joint immobility or irritation anywhere along the body can ultimately lead to a greater risk of suspensory injury.

More than the trigger points, in many instances, suspensory injuries can cause lameness and prevent the horse from performance. Indeed, depending on the severity of the suspensory injury, some horses never return to full work at the same level after injury. These can therefore be considered more catastrophic than the trigger points described above.

3.4 Treatment and prevention of suspensory injuries

As with all osteopathic treatment, veterinary supervision and sign off is crucial, particularly when a horse has sustained an injury. Osteopathic treatment would not ordinarily be advised in the acute phase of injury, unless advised by a vet. In rehabilitation, the research indicates

that practitioners can use joint mobilisation and passive stretching (Hausler 2018, Atalaia et al, 2021) in combination with soft tissue massage and manipulation to accelerate soft tissue healing and promote overall muscular and skeletal health. Ridgway (2007) amongst others also argues for the benefits of exercise and movement, even in a rehabilitation setting. For the restoration of soft tissue health, massage therapies have been researched including Swedish techniques, effleurage, petrissage, kneading and lymphatic drainage. Although the clinical evidence of the benefits is limited, reviews such as Atalaia et al (2021) and Hausler (2018) argue that there are benefits achieved, particularly in combination with passive stretches.

Joint mobilisation and tissue manipulation can also be argued to have a positive effect, particularly by restoring range of motion and muscle health to the chain of stabilising muscles that can then protect the suspensory ligament.

Given that the research reinforces the connectedness of the body as it relates to suspensory injuries sustained by dressage horses, the practitioner could also consider osteopathic techniques to restore overall health to the body and thereby potentially limit the risk of suspensory injury in the first place. For example, the horse may be regularly rebalanced using OAB. The horse's stabilising systems may be regularly checked and supported with osteopathic techniques, and any trigger points identified may be managed so as to reduce the risk of suspensory injury. Elbrond and Schultz (2015) highlight the fascial lines that connect myofascial trigger points from poll to hindlimb, thereby suggesting to this researcher the need to treat both the trigger point and the whole body. As expected, this research could not find any clinical evidence of osteopathy definitively preventing suspensory injury. However, the benefits presented above allow the practitioner and owner/rider to hypothesise that regular treatment can support the performance of the horse (Lange et al, 2018, Hausler, 2018).

4. Limitations

As indicated by most current research in this field, many limitations are due to a lack of available research subjects, as well as to the nature of possible interactions with the research subjects. Unlike with humans, research with horses must rely on techniques such as sonography, magnetic resonance imagery, thermal diagnostic imagery, independent manual palpation, grimace scores and other non-verbal sources of information.

Limitations are also identified due to the lack of high quality, clinical evidence, as perceived by researchers. Many of the systematic reviews and meta-analyses considered in this research eliminated large numbers of papers due to lack of control group, inconsistency of application of techniques (particularly manual techniques applied in different protocols) and the variable availability of follow up data. Research in this field to date as built on the strength of positive results rather than large samples of statistically significant data with clinically identical and therefore repeatable diagnoses and techniques applied.

5. Conclusions and further research

This paper argues that osteopathy can play a substantial part in supporting performance of elite sport horses, particularly dressage horses. The paper finds that dressage horses are at risk of some specific injuries or dysfunctions that may inhibit their performance, namely suspensory ligament injuries – notably in the hindlimb – and myofascial trigger points – notably in the cervical vertebrae. The paper finds that these can be treated and potentially prevented with a range of osteopathic techniques, both at a local level and more holistically.

Further research would benefit our understanding of the effectiveness of specific techniques such as systemic mobilisation to restore health, as well as to grow the evidence base with relevant case studies.

References

Table A: Reviewed papers from searches

Searches on Google Scholar:

1. Keywords – needs and challenges, sport horses, elite performance horses, grand prix horses
2. Keywords - equine osteopathy, sport horses, performance horses, dressage, showjumping
3. Keywords – (equine) osteopathy, myofascial trigger points, SI pain, cervical, myofascial release, suspensory injury, rehabilitation

Date	Title, Authors, Journal	Summary
2025	Boado, A., Pollard, D., Dyson, S., (2025) Retrospective analysis of suspensory ligament branch injuries in 70 dressage horses, Animals, 15:21	Most injuries are front not back – 59-42 Lateral branch more than medial branch (75:25) Good recovery in 63% of horses SL is subject to asymmetric loading in high level dressage movements
2025	Calatayud-Bonilla, M., Carmona, J.U., & Prades, M. (2025). *Clinical effectiveness of dry needling on myofascial trigger points in horses: A prospective algometric controlled study*. Animals (Basel), 15(11), 1558. https://doi.org/10.3390/ani15111558	Dry needling can help resolve equines with MfTPS – control group shows no change
2025	Portier, K., Schiesari, C., Gauthier, L., Yeng, L.T., Fantoni, D.T., & Formenton, M.R. (2025). Comparison of the prevalence and location of trigger points in dressage and show-jumping horses. *Journal of Equine Rehabilitation*	Identifies significant differences between dressage and showjumping horses, with dressage having more trigger points in neck and showjumping in pelvis
2025	Ramon, T., Álvarez, C.B.G., Elmeua, M., Carmona, J.U., & Prades, M. (2025). *Effect of a single osteopathic manipulation on the sacroiliac joint in sport horses with sacroiliac dysfunction*. Journal of Equine Rehabilitation.	OMT improves gait symmetry and functional scoring in sport horses with SI dysfunctions.
2025	Ramon, T., Álvarez, C.B.G., Carmona, J.U., & Prades, M. (2025). *Effect of a single, one time off osteopathic manipulation of dysfunctional caudal cervical vertebrae in non-lame sport horses*. Journal of Equine Rehabilitation, p.100037.	One OMT session positively impacts non-lame sport horses.
2025	Ross, M., Proudfoot, K., Merkies, K., Lundgren, C., & Ritter, C. (2025). *A wicked problem: Systemic issues surrounding Canadian equestrian dressage and dressage horse welfare*. Cambridge University Press.	Dressage horse welfare is challenged by performance-driven methods.
2025	Future Intelligence. (2025). *Equine Veterinary Therapeutics Market Size and Share Forecast Outlook 2025 to 2035*. Retrieved from https://www.futuremarketinsights.com/reports/equin-veterinary-therapeutics-market	Market growth noted; injectables comprise 53% of the market.
2024	Guest, D., Birch, H., Thorpe, C, (2024) A review of the equine suspensory ligament: injury prone yet understudied, Equine Veterinary Journal, 27th November, 2024 (**https://doi.org/10.1111/evj.14447**)	Dressage horses have more hindlimb SL injuries Looks at PRP, Laser and stem cell and ESW as treatments.
2024	Schumacher, A., & Gehlen, H. (2024). Health of polo horses. *Journal of Equine Rehabilitation*, 8(14), Article 12.	Polo horses predisposed towards gait asymmetry as injuries

2024	Reis, I.L., Lopes, B., Sousa, P., Sousa, A.C., Caseiro, A.R., Mendonça, C.M., Santos, J.M., Atayde, L.M., Alvites, R.D., & Maurício, A.C. (2024). *Equine Musculoskeletal Pathologies: Clinical Approaches and Therapeutical Perspectives—A Review*.	Comprehensive review of musculoskeletal therapies and modalities.
2023	Vokietytė-Vilėniškė, G., Babarskaitė, G., Pakalniškytė, E., & Žilaitis, V. (2023). *Effects of osteopathic manual therapy on the autonomic and immune systems and the hypothalamus-pituitary-adrenal axis in the horse*. Acta Veterinaria Brno, 92(1), 27–30.	OMT positively affects nervous and immune systems.
2023	Hobbs, S.J., Braganca, F.M.S., Rhodin, M., Hernlund, E., Peterson, M., & Clayton, H.M. (2023). *Evaluating Overall Performance in High-Level Dressage Horse–Rider Combinations*.	Symmetrical pelvic movement predicts higher gait scores.
2023	Williams, J.M., Berg, L.C., Clayton, H.M., Kirsch, K., Marlin, D., Randle, H., Roepstroff, L., Sloet van Oldruitenborgh-Oosterbaan, M., Weishaupt, M.A., & Munsters, C. (2023). *A Delphi Study on Managing Sporthorse Health and Welfare*.	Biomechanics are essential for sporthorse management.
2022	Broadhurst, M., (2022) A clinician's guide to myofascial pain in the equine patient. ISBN 9798428035889	Identifies pain patterns in the horse from trigger points
2022	Wu, M., Luan, L., Pranata, A., Witchalls, J., Adams, R., Bousie, J., & Han, J. (2022). *Is high intensity laser therapy more effective than other physical therapy modalities for treating knee osteoarthritis?* Frontiers in Medicine.	High intensity laser therapy reduces pain and improves function.
2022	Krupa, W., Topczewska, J., Garbiec, A., & Karpiński, M. (2022). *Is the welfare of sport horses assured by modern management practices?* Animal Science and Genetics.	33% of dressage horses are lame; ulcers and tail swishing also noted.
2022	Gómez Lucas, R., Rodríguez-Hurtado, I., Troteaga Álvarez, C., & Ortiz, G. (2022). *Effectiveness of Neuromuscular Electrical Stimulation and Dynamic Mobilization Exercises*.	Both therapies improve multifidus muscle cross-sectional area.
2022	Lu, W., Li, J., Lu, X., (2022) Effect of ischemic compression on myofascial pain syndrome: a systematic review and meta-analysis, Chiropractic and Manual Therapies Sep 1;30:34. doi: 10.1186/s12998-022-00441-5 PMCID: PMC9434898 PMID: 36050701	11 studies and 427 patients reported post treatment positive effects, whereas 7 studies and 251 patients reported no difference. Argues that impact is minimal, relating mainly to increasing tolerance to pain.
2022	Coelho, C.S., Silva, A.S.B.A., Santos, C.M.R., Santos, A.M.R., Vintem, C.M.B.L., Leite, A.G., Fonseca, J.M.C., Prazeres, J.M.C.S., Souza, V.R.C., Siqueira, R.F.S., Manso Filho, H.C., & Simões, J.S.A. (2022). *Training Effects on Stress Predictors for Young Lusitano Horses*.	Less stress observed during dressage tests.
2021	Atalaia, T., Prazeres, J., Abrantes, J., Clayton, H., (2021) Equine rehabilitation; a scoping review of the literature. Animals 2021, 11(6) 1508; **https://doi.org/10.3390/ani11061508**	Manual therapy and passive stretching for rehab – hold for 30s not 15 Tissue mobilisation to reduce adhesions and accelerate healing, including effleurage, petrissage, skin rolling, tapotement and friction – also beneficial when used in combination with passive stretching, joint mobilisation post surgery, especially beneficial with back problems,
2021	Haussler, K.K., Hesbach, A.L., Romano, L., Goff, L., & Bergh, A. (2021). *A Systematic Review of Musculoskeletal Mobilization and Manipulation Techniques*.	833 articles reviewed; highlights need for more research.
2021	Story, M., Haussler, K. K., Nout-Lomas, Y., Aboueillel, T., Kawcak, C., Barrett, M., Frisbie, D., MacIlwraith, C., Equine	Identifies range of cervical pain causes, and potential treatments

	Cervical Pain and Dysfunction: Pathology, Diagnosis and Treatment, Animals, Volume 11, Issue 2, 10.3390/ani11020422	
2018	Brooks, J., & Pusey, A.G. (2018). Osteopathy and its application in the treatment of musculoskeletal dysfunction in horses. *Cambridge University Press*. Published online: 27 February 2018.	Introduction and overview to the osteopathic principles and systems
2018	Hausler, K., (2018) Equine Manual Therapies in Sport Horse Practice, The veterinary clinics of North America, Equine Practice, May 2018	Highlights diagnostic benefits of manual therapies to prevent or rehab from injury. Touch therapies and massage can help with trigger points and isolated issues, gentle joint mobilisation helps limit adverse effects of box rest and acute inflammation and accelerates soft tissue healing as well as restore proprioceptive mechanisms, active stretches help with stiffness, osteoarthritis. Results of mobilisation versus manipulation are mixed.
2018	Lange, C.D., Flammer, S.A., Gerber, V., Kindt, D., & Koch, C. (2018). *Complementary and alternative medicine for orthopaedic problems in Swiss Warmblood horses*. Veterinary Medicine and Science, 4(4), 373.	CAM used in over 50% of back/lameness cases; vets not always consulted.
2017	Giacomini, JP, (2017) *Mastering Lightness, Part 2: Understanding the Biomechanics*, Warmbloods Today, 51-55, September/October Issue	Lightness is important in all disciplines but when lacking in dressage can lead to significant injury and strain.
2015	Elbrond, V., Schultz, R., Myofascia: the unexplored tissue – Myofascial kinetic lines in horses, a model for describing locomotion using comparative dissection studies derived from human lines. Medical Research Archives, Issue 3 https://esmed.org/MRA/mra/article/view/125/58	26 horses dissected. Redrew human myofascial lines but establishes connectivity along the lines beyond single muscle issues. Superficial dorsal and ventral lines connect from poll and skull through to hindlimb SL branches. Shows why proper teeth and TMJ articulo are connected to shoeing and lameness
2014	Colles, C.M., Nevin, A., & Brooks, J. (2014). *The osteopathic treatment of somatic dysfunction causing gait abnormality in 51 horses*. Equine Veterinary Education. https://doi.org/10.1111/eve.12122	OMT effective when lameness resists standard veterinary treatment.
2014	Greve, L., Dyson S., (2014) Saddle fit and management: An investigation of the association with equine thoracolumbar asymmetries, horse and rider health, Equine Veterinary Journal, Vol 47 Issue 4	Connects saddle slip with thoracolumbar asymmetries, rider back pain and poor hind limb gaits.
2013	De Coster, P.P. (2013). *SWISS INTERNATIONAL COLLEGE OF OSTEOPATHY*.	Immediate dressage score improvement post-OMT; no difference after one week.
2013	Mendez, Manolo (2013), *Manolo Mendez on Pirouette*, Part III, Baroque Horse Magazine	Shows strain of pirouette when correctly and incorrectly executed on horse
2011	Pusey, A., Brooks, J., & Jenks, A. (2011). *Osteopathy and the Treatment of Horses*. John Wiley & Sons.	Detailed guide to equine anatomy and osteopathic techniques. Balance is the common denominator for dressage

		horses. Start with top line, then abdominal musculature, then engaged quarters, lighter self carriage. Although this is also true for non dressage horses. Practitioners must enable horses biomechanically to overcome any limitations to maximise achievement. Addresses cervical region dysfunctions as preventing shoulder in and lateral movements, as well as
2010	Murray, R.C., Dyson, S., Tranquille, C., Adams, V, (2010) *Association of type of sport and performance level with anatomical site of orthopaedic injury diagnosis*, Equine Veterinary Journal https://doi.org/10.1111/j.2042-3306.2006.tb05578.x	Risk of hindlimb suspensory ligament injury in dressage (both elite and non)
2009	Haussler, K.K. (2009). *Review of manual therapy techniques in equine practice*. Journal of Equine Veterinary Science, 29(12), 849–869.	Reviews technique efficacy; calls for more controlled studies.
2009	Thoresen, A. (2009). Case reports: Effect of osteopathic manipulations on performance in 374 horses with suspected sacroiliac and/or hip joint dysfunction and back pain: 2006–2007. *Zeitschrift für Ganzheitliche Tiermedizin*.	OMT positively impacts over 80% of cases of horses with suspected SI dysfunction, hip or back pain
2009	von Borstel, U.U., Duncan, I.J.H., Shoveller, A.K., Merkies, K., Keeling, L.J., & Millman, S.T. (2009). Impact of riding in a coercively obtained Rollkur posture on welfare and fear of performance horses. *Applied Animal Behaviour Science*, 116(2–4), 228–236.	Dressage horses can be subjected to rollkur and other poor practices that negatively impact welfare and health
2007	Ridgway, K., (2007) Upper thoracic fixation and hypomobility, North American Veterinary Conference, 2007	High percentage of suspensory injuries are set up by tension or shortening of stabilising muscles, transferring stress of impact to suspensory. Elastic state of posterior shoulder muscles should stretch and act as chain of stabilising muscles, but if these are in tension or hypertonicity for example from bad saddle fit, then suspensory takes up too much weight.
2006	Rickards, L. (2006). The effectiveness of non-invasive treatments for active myofascial trigger point pain: A systematic review of the literature, *International Journal of Osteopathic Medicine*	Magnets, TENS, EMS, needles and physical stretches and massages were reviewed in this systematic review. Most studies were medium or low quality.
2006	Murray, R.C., Dyson, S.J., Tranquille, C., & Adams, V. (2006). *Association of sport type and performance level with orthopaedic injury site*. Equine Veterinary Journal. https://doi.org/10.1111/j.2042-3306.2006.tb05578.x	Hindlimb suspensory and proximal DDFT are major risks in dressage.
2005	Niel-Asher, S., (2005) The concise book of trigger points,	Techniques include inhibition ischaemic compression technique, isometric and isotonic contraction techniques, taping, deep stroking massage, manual lymphatic drainage

2004	McPartland, J., (2004), Travell trigger points, molecular and osteopathic perspectives JAOA • Vol 104 • No 6 • June 2004	Discusses evolution of theory on source and understanding of trigger points. Current view is motor end plates contacting the target muscle fibres become dysfunctional, either pre or post-synaptic contact. Travell and Simons argue that there is an excessive release of acetylcholine (ACh) from a motor nerve terminal, which in the synaptic cleft activates nicotinic ACh receptors (nAChRs) on the post-synaptic muscle membrane, leading to muscle contraction. References OMT techniques for resolving trigger points
2003	Kold, S.E., & Dyson, S.J. (2003). Lameness in the dressage horse. In *Diagnosis and Management of Lameness in the Horse* (Elsevier: London, UK). https://doi.org/10.1016/B978-0-7216-8342-3.50124-8	
2002	McPartland, J., An osteopathic appreciation of Janet Travel	Reviews trigger point theory. Shares OMT techniques including Lewit Technique, counterstrain, HVLA techniques. OMT can be used but requires more treatments. Alternatives are dry needling, cooling creams
1992	Travell JG, Simons DG. (1992) *Myofascial Pain and Dysfunction: The Trigger Point Manual: The Lower Extremities.* Vol.2 . Baltimore, Md: Williams & Wilkins	Trigger point theory and techniques. For humans