



Acupuncture Therapy for Back Pain in Horses

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ABSTRACT

The treatment of equine back pain (EBP) is very challenging and often not very successful. The relatively low efficacy of current treatment regimens for EBP is mainly associated with nonspecific and multifactorial causes of the condition. This has concerned the equine industry, leading equine practitioners and horse owners to seek alternative and traditional cures to treat the condition. One of the alternative therapies is acupuncture, a technique rarely used on horses with back pain. Although acupuncture is still a controversial technique among veterinarians, equine practitioners are now exploring the method to treat disease conditions in their horses. There is no doubt that acupuncture alone or as an adjunct therapy to modern medicine has significantly improved the recovery rate of equine back pain. This review looks at the use of acupuncture in the treatment of EBP. Various available acupuncture techniques and their mechanisms of action are discussed.

Key words: acupuncture, acupoints, back pain, horse

1.0 INTRODUCTION

Equine back pain (EBP) is one of the major causes of poor performances in athletic and work horses. The disorder is primarily due to abnormalities in spine structures or secondarily to lameness (Mayaki *et al.*, 2020). Diagnosis of EBP has been very challenging because of the nonspecific or multifactorial aetiologies that are complicated by lack of desired results with conventional therapy. The lack of success in managing cases of back pain often suggests underlining disorders that may require alternative therapeutic approaches such as acupuncture.

Acupuncture is a safe technique with very little or no harmful side effect and is tolerated by different animal species including horses (Shmalberg *et al.*, 2019a, Xie and Holyoak, 2021; Zhao *et al.* 2024). In equine practice, acupuncture is being used complementary to current protocols in the treatment of various ailments. Acupuncture is not only used to alleviate pain, but also in the diagnosis of disorders in performance horses. In fact, acupuncture is particularly sensitive and specific for the detection and treatment of lameness (Shmalberg *et al.*, 2019b; Aljobory *et al.*, 2021). It's use has also been recommended for chronic back pain in human by the society for research practices (Mao *et al.*, 2019; Mao *et al.*, 2024).

1.1 Acupuncture in equine practices

Acupuncture is a Chinese medical procedure in which the body is stimulated by inserting needles into acupuncture points for clinical therapy and pain relief (Lin *et al.*, 2022). The responsiveness of equine species, particularly horses, to the touch of acupuncture points has facilitated the localization of acupuncture points for diagnostic purposes, making acupuncture a useful technique in clinical practice (Shmalberg *et al.*, 2019b; Pasteur, 2021; Xie and Holyoak, 2021). In

horses, acupuncture has been used to treat musculoskeletal pain, lameness, gastrointestinal problems, to diagnose lameness, and for rehabilitation after injury. The use of acupuncture in animals is not new; the technique has been used for thousands of years by the Chinese army to treat horses. In fact, the technique is documented in ancient Chinese books like *Si Mu An Ji* (A Collection of Ways to Care for and Treat Horses) and Yuan-Heng's Therapeutic Treatise of Horses (Tangjitjaroen *et al.*, 2009). However, it was not until the 1970s, with the formation of the International Veterinary Acupuncture Society (IVAS) that veterinarians became sensitized to the benefits of acupuncture as a therapeutic procedure for animals (Lancaster and Bowker, 2012).

1.2 Acupuncture needles

Acupuncture primarily uses different types of needles; hypodermic (three-edged, wide, and bevelled), filiform, and sterile hollow needles. In veterinary acupuncture practice, the filiform needle is most commonly used because it is least painful to apply (Pellegrini *et al.*, 2020; Xie and Holyoak, 2021). These needles are reusable stainless steel, solid, and flexible with round tips and about 26 to 30 gauge. The use of hypodermic needle which is easier to apply has been reported to efficacious in animals like horses (Pellegrini *et al.*, 2020). Sterile hollow needle is used in aqua-puncture, in soluble sterile medium, and in pneumo-acupuncture in fresh sterilised air. The hypothermic needle is relatively resistant to bending, and may cause bleeding, thus, painful. The gauge and length of acupuncture needles depend on the size of the animal, location, and depth of the acupoints. Thick and long needles are more stimulating than thin short needles and they are used in strong and large patients, while thin short needles in small, weak, and geriatric patients.



1.3 Acupuncture points

In Chinese medicine, human health is believed to be dependent on the balance between two opposing forces, *yin* and *yang*, that maintain human body homeostasis by regulating the flow of vital energy or *qi*. A balanced *yin* and *yang* interaction with normal vital energy flow indicate healthy state, while any disturbance in *qi* flow due to imbalanced *yin* and *yang*

interaction will lead to disease. The concepts of Yin and Yang interactions and its relations with the disease pattern is shown in Table 1 (Pellegrini *et al.*, 2020). The flow of *qi* from the inner parts of the body to the skin surface is believed to occur through a network of channels known as meridians. Thus, any disorder of the internal organs will be reflected at the specific acupoints on surface of the body. In altered conditions, the stimulation of these acupoints allow for the restoration of normal physiology (Schmid and Aebischer, 2021).

Table 1: The concepts of Yin and Yang interactions and its relations with the disease pattern

Characteristic	Yin	Yang
Onset of signs	Chronic	Acute
Qi or Blood	Blood	Qi
Body surface	Abdomen, ventral, medial	Back, dorsal, lateral
Shape	Flat	Round
Fitness	Weakness	Strength
Preferred climate	Hot	Cold
Nature	Cold, chronic, degenerative, cool, deficient, night, moon, negative, humidity,	Hot, acute, proliferative, warm, excess, light, sun, positive, dryness,
Autonomic nervous system	Parasympathetic	Sympathetic
Metabolism	Hypo-metabolism	Hyper-metabolism
Urinary system	Clear urine, polyuria, Urinary incontinence	Dark urine, anuria, urine retention

The acupuncture techniques are based on the meridian theory. The meridian is the “channel” for transmitting vital energy through the subcutaneous space and this can be targeted by the acupuncture needle placed at appropriate point(s) on the body, creating channels of communication between the 361 different points in the body (Lu and Javernick, 2021). Evidences based on an array of techniques like electrical conductance, thermal imaging, magnetic resonance imaging (MRI) and radioisotopes labelling, suggest the existence of acupuncture meridians (Schmid and Aebischer, 2021).

The identification of acupoints is based on the type and location and order on meridian channels. There are 14 major and 8 extra meridians and least 400 acupoints in the body; the majority of acupoints are found in the major meridians including the lungs (LU), heart (HT), pericardium (PC), stomach (ST), liver (LR), triple energizer (TE), large intestine (LI), small intestine (SI), spleen (SP), gallbladder (GB), bladder (BL), kidney (KI), governing vessel (GV), and conception vessel (CV). The identity of acupoints with reference to the meridians and their locations, either in the midlines, nerve, motor or musculotendinous junction of the meridian channel. For example, the 12th acupoint on the bladder meridian channel is identified as BL-12.

Acupuncture points or acupoints in horses were first identified by the transposition of human anatomical points to similar locations in the animal. However, due to obvious anatomical differences between horses and humans, some adjustments are required for the location of these acupoints. For example, horses have more thoracic and lumbar vertebrae than humans and there is only one digit per limb in horses. The procedure using anatomical transposition approach in equine acupuncture has yielded good results in the treatment of thoracolumbar pain, chronic lameness, degenerative joint diseases, laryngeal hemiplegia, and reproductive disorder (Aljobory *et al.*, 2021, Xie and Holyoak, 2021; Pasteur, 2021). The major meridians used to treat conditions, diseases, and behavioural abnormalities in horses is listed in Table 2. The governing vessel and inner and outer bladder meridians are mostly used to treat back pain (Figure 1) (Bello *et al.*, 2018; Sheta *et al.*, 2019). Governing vessel meridian begins at a point between the anus and the ventral tail base (GV-1) and continues cranially along the midline of the back to the poll where it descends to a point at the centre of the upper lip mid between the ventral limits of the nostrils (GV-26), and ending at a point between the upper lip and upper gum (GV-28). The bladder meridian starts at a point at the medial canthus of the eye (BL-1) and continues caudally lateral to the midline passing over the head and caudally along the dorsal aspect of the

neck to a point lateral to the midline between the second and third thoracic vertebrae (BL-11). At this point, the meridian splits into two branches, inner and outer branches, that run caudally parallel to the spine, over the hip and down the posterior aspect of the hindlimb. The inner branch run at a distance 3 cun

(Chinese inch) lateral to the dorsal midline, while the outer branch runs 6 cun lateral to the midline. The two branches merge at the popliteal aspect of the hindlimb to end at a point on the caudolateral aspect of the hindlimb, just cranial to the lateral collateral cartilage proximal to the coronary band (BL-67) (Schoen, 2001).

Table 2: Acupoints used for diagnosis and management of diseases and disorders in horses

Acupoints	Disease and Disorder	References
BL-14, 16, 19, 23, and 26	Back soreness	Sheta et al., 2019
B-2, 3, 40, 52, 60; E-36; GV-3, 4, 20; VB-27; <i>Hua Tuo Jai Ji</i>	Back pain	Bello et al., 2018
HT-9, PC-9, LU-11, SI-1, TH-1, LI-1, <i>Qian-Ti-Tou</i> , <i>Qian-Ti-Tou</i> , and <i>Qian-Ti-Men</i>	Lameness due to laminitis	Lee et al., 2019; Aljobory et al., 2021
BL-20, 21; GB-27; SP-13;	Stifle diseases	Mariani et al., 2019
<i>An-shen</i> , GV-24, HT-7, PC-6, BL-14, and BL-15	Anxiety	Ying et al., 2019

Meridians: LU=lung (LU), HT=heart, PC=pericardium, ST=stomach, LR=liver, TE=triple energizer, LI=large intestine, SI=small intestine, SP=spleen, GB=gallbladder, BL/B=bladder, KI=kidney, GV=governing vessel, CV=conception vessel, *Bai-hui*=20th point on GV, *Yan-chi*

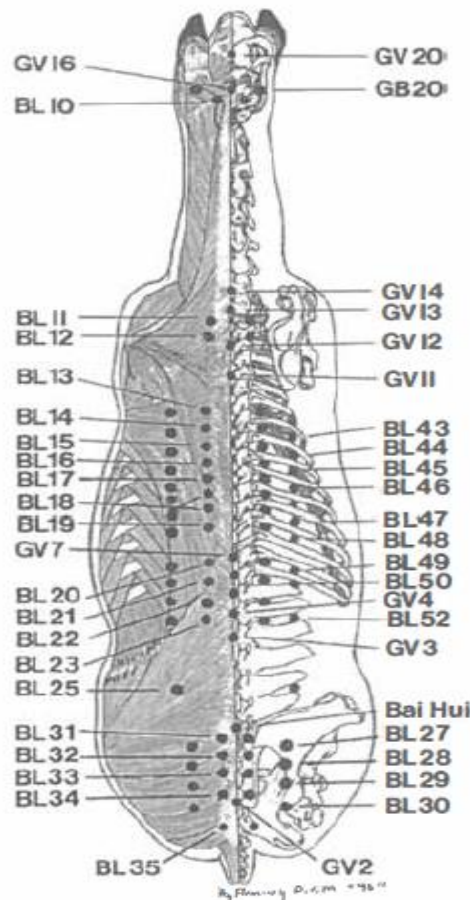


Figure 1: Horse acupoints (illustration by P. Fleming, copyright 1994). Adapted from Schoen (2001), the dorsal image of the horse spine shows the common acupoints' locations in relation to the muscles and vertebral column.



2.0 METHODS OF ACUPUNCTURE THERAPY

There are several acupuncture methods currently used in humans and animals. The most commonly used methods in horses are dry needling, electroacupuncture, and aquapuncture (Shmalberg et al., 2019b; Xie and Holyoak, 2021). The duration of treatment and the healing rate vary between the different methods. In general, each treatment session varies between 5 and 30 minutes, and may require several treatment sessions depending on the severity and chronicity of the condition being treated (Lee et al., 2019; Aljobory et al., 2021).

2.1 Dry needle acupuncture

The traditional dry needle acupuncture is the earliest and most popular in veterinary medicine (Xie and Holyoak, 2021). It is performed by inserting a small filiform or round-sharp acupuncture needles of different gauge (28- to 32) and length (and 13 to 100 mm) at the acupoints. For example, 28-gauge needles are mostly used for the back Shu-acupoints while the 30-gauge needles for common acupoints (Pellegrini et al., 2020). This technique is preferred because it is inexpensive, does not require electronic tools, and rarely cause bleeding. The technique has been used successfully in the treatment of horses with musculoskeletal pain (Shmalberg et al., 2019b). However, dry needle acupuncture provides low stimulation, thus, frequent treatment may be necessary for optimum results (Lee et al., 2019).

2.2 Electroacupuncture

Electroacupuncture uses acupuncture needles for the delivery of electrical current at the acupoints. The electrical input can be adjusted to deliver electrical current at optimum frequency and amplitude. In case of acute pain or muscle spasm, the most effective frequencies range is 80 to 100 Hz (Duan-Mu et al., 2021). It should be noted that high electrical frequencies (80 – 120 Hz) are rapid and short-lived, while low frequencies (around 20 Hz) provide cumulative effect (Xie and Holyoak, 2021). In electroacupuncture, the placement of needles at the acupoints need be very accurate to produce long-lasting effects. This technique has been used successfully in horses for the treatment neurological or behavioural disorder like head sheding or musculoskeletal disorders, including chronic back pain (Devereux, 2019; Shmalberg et al., 2019b; Aljobory et al., 2021).

2.3 Aquapuncture

Aquapuncture is conducted by injecting sterile soluble solution or fluid at the acupoints using hypodermic needle. It is also referred to as pharmacopuncture,

when pharmacological agents are injected. The solution creates pressure at the acupoints resulting in constant and continuous stimulation. In the treatment of pain in horses, the solutions used include saline, 15% dextrose, 2% procaine, vitamin B12 and 25% magnesium sulphate (Shmalberg et al., 2019b). Alleviation of back pain in horses was achieved by injecting cloprostenol in to the bladder acupoints (Sheta et al., 2019). This technique is cheaper and not as time-consuming as the dry needle or electroacupuncture techniques.

2.4 Laser acupuncture

Laser acupuncture employs soft laser light, either continuous or pulsed, to stimulate the acupoints for healing effect and restoration of haemostasis. The laser light generates energy at the acupoints causing hyperpolarization that dulls pains (Petermann, 2006). The therapeutic effect of acupuncture laser technique can be achieved with wavelength in the infra-red spectrum, 630 - 905 nm (Ying et al., 2019). Laser acupuncture is very beneficial in cases where the acupoints locations are difficult to reach or for horses that are apprehensive of needles.

2.5 Moxibustion

Moxibustion uses burned dried moxa stick, made from the herb *Artemisia argyi* that is applied near acupoints or at the end of acupuncture needles placed at the acupoints (Pellegrini et al., 2020). The technique works by stimulating the acupoints through warming effects and it is usually used to treat swellings and musculoskeletal pains. Moxibustion creates energy flow or *qi* that stimulates blood circulation at the acupoints. This technique is especially recommended in cold environments. The technique can either be used alone or in combination with dry needle or point injection methods for optimum therapeutic effects. However, the unpleasant odour or smoke from the burning of the herb may not be tolerable by the horses (Shmalberg and Xie, 2011).

2.6 Hemoacupuncture

Hemoacupuncture is a method by which hypodermic needle is inserted into the veins at the acupoints to draw blood or administration of autologous blood (Shmalberg et al., 2019b). This technique can only be performed once in every three weeks and at the acute onset inflammation or fever. However, hemoacupuncture should be avoided in anaemic patients. Without adequate training and use of proper technique, hemoacupuncture may lead to haemorrhages and coagulopathy.

2.7 Acupressure

Acupressure is applied by placing fingers at the acupoints and pressing for 5 to 10 min or by firmly massaging the area or a rounded plastic probe to



pressurize the sensitive acupoints (Mariani et al., 2019). This procedure can be used for diagnosis and treatment of musculoskeletal pain. Because it does not require any device or equipment, it can be performed by the horse owner. The main benefit from acupressure in high-performance horses is to induce relaxation and relief of muscle spasm. The healing effect of acupressure can be enhanced when used in combination with other types of acupuncture techniques.

3.0 MECHANISM OF ANALGESIC EFFECT OF ACUPUNCTURE THERAPY

The most common application of acupuncture is the treatment of pain. Most studies on the mechanism of acupuncture therapy in pain relief have focused on the neural mechanism (Lin et al., 2022). The involvement of the nervous system in the analgesic effects is based on the inhibition of pain induced by local anaesthetics injected at the acupuncture points. There are three levels in the neurobiological mechanisms of acupuncture: the tissue level, the spinal cord level and the brain stem level (Dewey and Xie, 2021). The local effects begin with the insertion of an acupuncture needle into the acupuncture point, which leads to micro-injury, local vasodilation and an increase in blood flow, which ultimately initiates healing and blocks pain sensation (Fan *et al.*, 2019). Inhibition of pain sensation at the tissue level is due to either the local release of endorphin or enkephalin, which suppress the nociceptive pathway or inhibition of cyclooxygenase-2 (COX-2) and prostaglandin E2 (PGE2) production in the area stimulated (Yen *et al.*, 2019). In the second level, the impulse generated by acupuncture inhibits pain sensation within the same segment the spinal cord (Fan *et al.*, 2019; Kim et al., 2020). Pain inhibition at the substantia gelatinosa in the spinal dorsal horn is believed to occur through type A β sensory fibers or the descending pain inhibition pathway as a result of release of opioid-like endorphins and neurotransmitters. This mechanism is described as

the somato-sympathetic reflex that does not involve the brain. Thus, acupuncture needle inserted at acupoints will stimulate muscles and transmit signals through the sensory fibers to the spinal dorsal horn. The sensory signals are then conveyed to the visceral organs through sympathetic fibers. The suppression of P2X3 expression in the dorsal root ganglion has been implicated in the mechanism of analgesic effects of acupuncture (Xiang et al., 2019; Fei et al., 2020). In the third level, the pain signals from the spinal cords of the brainstem and hypothalamus integrate with release of endogenous opioids like β -endorphins, serotonin, and dopamine into the circulatory system (Quandt and Dewey, 2019; Yen *et al.*, 2019; Dewey and Xie, 2021). The pain impulses are inhibited by the opiates and neurotransmitters producing analgesia that can last for as long as 48 hours following acupuncture treatment. The neuronal pathway in the third level is known as the brain level somato-parasympathetic reflex. The suppression of oxidative stress to alleviating inflammatory pain was recently reported (Zhang et al., 2023).

3.1 Performance of acupuncture therapy in equine back pain

Acupuncture therapy has been shown to be quite efficacious for treatment of equine lameness associated with laminitis, fetlock, and shoulder injuries, paresis, and paralysis (Lee et al., 2019; Aljobory et al., 2021). However, the primary benefit from acupuncture therapy is relieve of pain. In the treatment of EBP, pain relief can be immediate or slow, depending on the type and severity of musculoskeletal dysfunction (Bello et al., 2018). The response to acupuncture is often rapid for acute injuries following only a few treatment sessions. However, in chronic musculoskeletal disorders, the treatment period may be prolonged and periodic before the condition can be completely resolved. Clinical benefits from acupuncture treatment also differ with acupuncture technique and acupoints used (Table 3).

Table 3: The effectiveness of acupuncture in treating back pain in horses

Technique	Horses (number)	Improvement of symptoms		References
		Yes (%)	No (%)	
Needle acupuncture	15	86.67	13.33	Klide, 1984
cloprostenol-pharmacopuncture	25	100.00	0	Sheta et al., 2019
Laser acupuncture	15	73.33	20.00	Martin and Klide, 1997
Aquapuncture (saline + methylprednisolone)	15	53.33	46.67	Martin and Klide, 1997
Aquapuncture	84	100.00	0	Merriam, 1997
Aquapuncture + TVM	62	100.00	0	Merriam, 1997
Laser acupuncture	512	98.00	2.00	Petermann, 2002



Aquapuncture	8	100.00	0	Xie <i>et al.</i> , 2005
Electroacupuncture	16	100.00	0	Rungsri, 2009

Muscle stiffness is one of the common signs of chronic back pain. The pain is due to the prolonged muscle shortening reflex that involves the myofascial, muscular or ligamentous tissue. Acupuncture therapy can relax these muscles, particularly the most affected paraspinal muscles. Acupuncture needles at the myofascial acupoints cause local muscle contraction through the local effect of endorphins and neuropeptide with subsequent cause repolarization of muscle fibers inducing relaxation. It was also shown that when the fire needling acupuncture was used, to treat chronic back pain in horses, 60% showed improvement after a single treatment, while 34% required two therapy sections before improvement.

Several clinical case reports showed that electroacupuncture is effective in the treatment of musculoskeletal pain in horses (Shmalberg et al., 2019b). Its analgesic effect depends on the electrical frequency and acupoints used. Horses treated with high frequency (80-120Hz) electrical input exhibit high pain threshold and plasma β -endorphin concentration. From these studies, it can be concluded that high is better than low frequency (20Hz) electric input in the induction of analgesia in horses. In addition, to produce the analgesic effect, high frequency electrical stimulation should be applied at acupoints close to the nociceptive area, while the application of low frequency electricity should in acupoints at some distance from the nociceptive area. In the treatment of thoracolumbar pain in horses, the analgesic effect required at least three sessions of electroacupuncture therapy to set in and persist for at least two weeks (Xie et al., 2005). Combination electroacupuncture and pneumoacupuncture was also used to treat muscular atrophy in the horse with back pain. The combined therapy produced some pain relief in these horses after two-week sessions.

Merriam (1997) reported that the use of acupuncture, particularly aquapuncture with sterile saline or vitamin B12 in treating primary back pain or back pain concurrent with hindlimb lameness accounted for 73% of their acupuncture therapy practices. The effectiveness of laser acupuncture in treatment of EBP has also been studied (Petermann, 2002). This study, conducted on 512 horses, showed that after the first session, chronic back pain was alleviated in 490 (95%) horses, while 12 (2.3%) showed improvement. The therapeutic effects of laser acupuncture were variable in the horses, where some required many sessions for re complete recovery.

CONCLUSION

This review described the scientific and clinical evidence for the benefits of acupuncture therapy in the

treatment of EBP. Based on the available scientific evidence, it appears that aquapuncture, electroacupuncture and laser acupuncture are the first choice for acupuncture treatment of EBP because they are either easy to perform, inexpensive or well tolerated. The number of treatment sessions can vary depending on the case and the type of acupuncture used, however the success rate is encouraging with a greater percentage of treated horses returning to work and performing well afterwards. There is no doubt that acupuncture as an integrative therapy to traditional western medicine is becoming more widely known and accepted by equine practitioners and horse owners.

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