

Research Paper

Horses Referred to a Teaching Hospital Exclusively for Acupuncture and Herbs: A Three-Year Retrospective Analysis



Justin Shmalberg, Huisheng Xie, Mushtaq A. Memon*

Department of Comparative, Diagnostic, and Population Medicine, College of Veterinary Medicine, University of Florida, 2015 SW 16 Ave, Gainesville, FL 32608

Available online 27 September 2018

Received: Jul 7, 2018
Revised: Aug 13, 2018
Accepted: Sep 18, 2018

KEYWORDS

acupuncture;
Chinese herbs;
equine;
retrospective;
veterinary

Abstract

Equine acupuncture and herbal medicine are increasingly popular and have been anecdotally used in the treatment of a number of conditions. There is, however, a lack of data on the most commonly treated conditions in horses. The medical records of 164 horses presented exclusively for acupuncture and herbal therapy over a three-year period from October 2012 to October 2015 were evaluated from a mixed animal integrative medicine service at a veterinary academic teaching hospital. Horses were presented primarily for musculoskeletal conditions (62.0%), gastrointestinal disorders (9.5%), and anhidrosis (6.1%). Nearly half of all treated horses were geldings, and the mean age of treatment was 10.7 ± 6.5 years. The most common breeds were Warmbloods (28.2%), Quarter horses (20.2%), Thoroughbreds (17.8%), and Arabians (8.0%). Treatments included acupuncture (90.2%), herbal supplements (79.8%), electroacupuncture (69.9%), B12 injections (pharmacopuncture, 29.4%), or administration of autologous blood at acupuncture points (hemoacupuncture, 8.0%). Thirty-eight (38) different herbal formulas were recommended during the study period. Horses that were not provided herbal recommendations were more likely to present with gastrointestinal complaints (odds ratio = 11.2). Sex, breed, and presenting complaint had no or minimal impact on the types of treatments performed during the visit. However, data regarding patient characteristics and presenting complaints provide novel information which can be used to design prospective clinical trials.

* Corresponding author. 2080 Pine Forest Drive NE, Atlanta, GA 30345, Georgia.
E-mail: memon@wsu.edu (M.A. Memon).

1. Introduction

Equine acupuncture and other aspects of Traditional Chinese Veterinary Medicine (TCVM) are increasingly referenced in the scientific literature, especially in the management of musculoskeletal conditions in horses. A recent survey identified acupuncture as a common reason for patient referrals, and respondent veterinarians generally agreed that horse owners viewed the modality favorably [1]. A survey of the American Association of Equine Practitioners reported monthly use of acupuncture by 18% of respondents [2]. An economic analysis identified English Sport horses as the most common group treated, and several studies have assessed acupuncture in racing Thoroughbreds [3–6]. However, a detailed retrospective analysis of cases receiving exclusively TCVM modalities has not been reported, nor has the characteristics of herbal administration, which is a concurrent intervention in many cases. This retrospective study examined the records of such patients and provides better definition of the characteristics of the patient population and the treatments used by the attending veterinary acupuncturist.

2. Materials and Methods

The medical records of equine cases exclusively referred for acupuncture and/or herbal therapies were collected from an academic veterinary teaching hospital (VTH) over a three-year period from October 2012 to October 2015. Cases were presented by self-referral or by recommendation of other veterinarians to the mixed animal integrative medicine service of the VTH. Patients were treated by the same clinician (H.X.). The following data were collected for each patient: age, breed, gender, the total number of visits during the study period, herbal prescriptions, primary and secondary presenting complaints, and the treatments elected, which included acupuncture, electroacupuncture (EAP), administration of autologous blood into acupuncture points (hemoacupuncture), and/or pharmacopuncture (B12 or cyanocobalamin injections). Presenting complaints were categorized into one of the following groups: anhydrotic, oncologic, musculoskeletal, neurologic, respiratory, gastrointestinal, dermatologic (nonanhydrotic), ophthalmic, reproductive, behavioral, or endocrine conditions.

Statistical analyses were performed between groups for continuous data, such as the number of visits and age, using commercially available statistical software (Minitab 17.1). Data were first assessed for normality using the Ryan–Joiner test. Normal data were compared using a student *t*-test or one-way analysis of variance, and nonparametric data were compared using a Kruskal–Wallis test. Results were considered statistically significant if the probability of error was less than 5% ($p < 0.05$). Post hoc analysis was performed using a Fisher test for pairwise comparisons for analysis of variance and a Dunn's test for nonparametric data. Odds ratios (ORs) were calculated, using the commercial software (Microsoft Excel 2010), to assess comparisons between specific patient populations grouped by treated condition, the treatments elected, and specific herbal prescription. A result was considered statistically significant if the 95% confidence interval (CI) for the OR excluded the value 1.0.

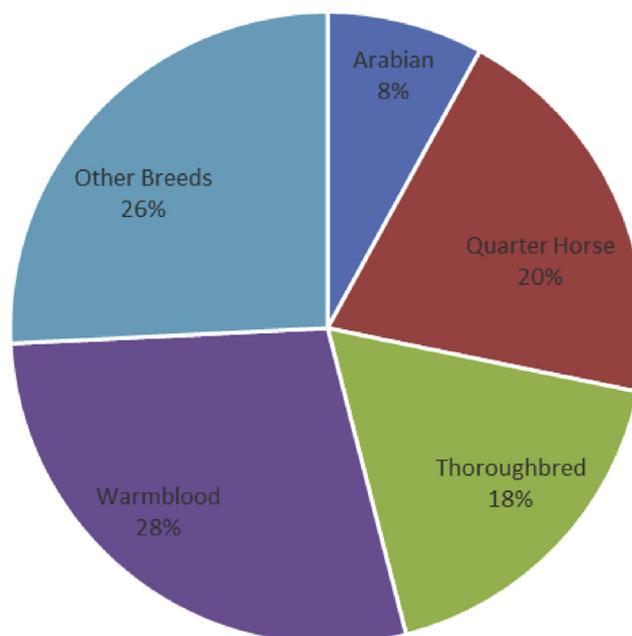


Figure 1 Distribution of horse breeds presented for acupuncture and/or herbal treatments at an academic veterinary teaching hospital over a 3-year period from October 2012 to October 2015.

3. Results

The VTH received 164 equine patients exclusively for acupuncture and/or herbal supplementation during the study period. Warmbloods, Quarter horses, Thoroughbreds, and Arabians were the breeds most commonly treated (Figs. 1–2). Geldings were most commonly treated as compared with stallions and mares (Fig. 3), and no differences were detected between sexes. The mean age at the time of treatment was 10.7 ± 6.5 years with a range of 0.09–33.5 years. Warmbloods and Quarter horses were significantly older than Thoroughbreds (11.0 ± 4.5 and 10.3 ± 6.8 vs. 9.6 ± 8.9 years, $p = 0.03$).

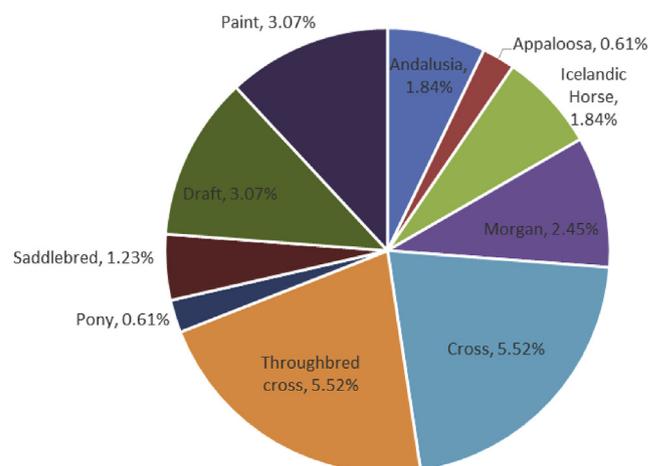


Figure 2 Distribution of "other breeds" presenting for treatments (% represents the percentage of total cases) with acupuncture and/or herbal therapy at an academic veterinary teaching hospital over a 3-year period from October 2012 to October 2015.

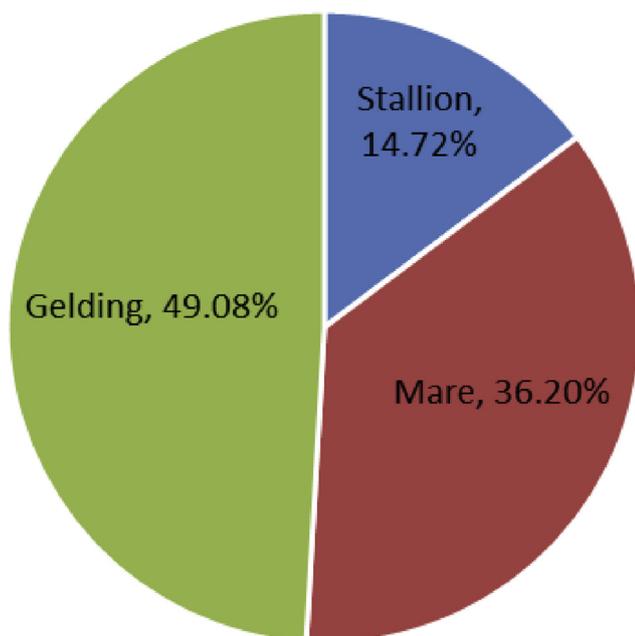


Figure 3 Sex distribution of horses presented for acupuncture and/or herbal treatments at an academic veterinary teaching hospital over a 3-year period from October 2012 to October 2015.

There was no significant correlation between age and the number of visits. Treated horses were presented for a diversity of conditions (Fig. 4). The mean number of visits per patient during the study period was 2.9 ± 2.6 with a range of 1-16 visits, and this treatment number did not statistically differ according to breed, recommended herbs, condition, or treatments elected.

The relative frequency of treatments elected from most to least common included acupuncture, herbal supplements,

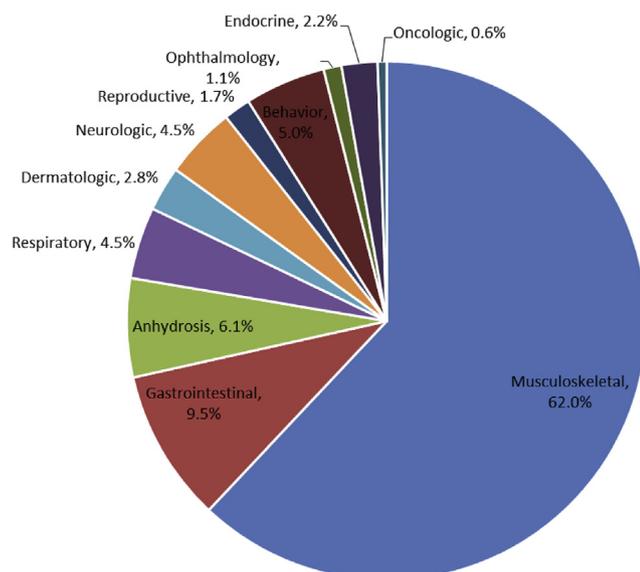


Figure 4 The presenting complaints of horses receiving acupuncture and/or herbal treatments at an academic veterinary teaching hospital over a 3-year period from October 2012 to October 2015.

EAP, pharmacopuncture (cyanocobalamin injections), and injections of the patient's blood (hemoacupuncture) (Fig. 5). Horses presenting with musculoskeletal conditions were more likely to receive autologous blood injections than were those with anhydrosis (OR = 8.7, CI = 2.2-33.6, $p = 0.002$). No other statistically significant differences were identified which affected treatment selection.

A number of traditional Chinese herbal formulas ($n = 38$) were recommended to clients. The two most common products were selected for comparison of patient characteristics (Fig. 6). Horses that were not provided herbal recommendations were more likely to present with gastrointestinal complaints (OR = 11.2, CI = 3.1-40.5, $p = 0.0002$), and similarly, horses presenting with gastrointestinal complaints were less likely than those treated for musculoskeletal disorders to receive herbs (OR = 0.7, CI = 0.02-0.2, $p < 0.0001$). They were also less likely to be administered herbs than were those horses with anhydrosis (OR = 0.016, CI = 0.001-0.3, $p = 0.007$). The commonly recommended herbal formula Wei Le San (derived from the classical formulas Xiao Yao San and Er Chen Tang) was more likely to be administered for gastrointestinal conditions than was Shen Tong Zhu Yu Tang (OR = 17.7, CI = 3.1-101.6, $p = 0.001$). Patients receiving this formula also were less likely to receive electroacupuncture (OR = 0.25, CI = 0.08-0.82, $p = 0.02$). No other differences were detected in patients receiving one formula over the other.

4. Discussion

The cases analyzed for this retrospective study represent only a small part (2%) of the caseload of the study site, which includes predominantly dogs and cats receiving multimodal therapies [7]. The study site has a separate sports medicine program for horses, and therefore, the limited types of treatments are likely reflective of referral or owner request for this type of treatment. The significant diversity in breeds was noteworthy and may suggest that horses with a variety of functions were presented for therapy. The younger age of Thoroughbreds is statistically significant and may represent periods of training when musculoskeletal injury is more common. The higher proportion of geldings could be reflective of ownership trends rather than suggestive of a predisposition to pathology which may be responsive to the modalities used in the treatment protocols. The fact that many horses were working horses could be influenced by rider biases toward mares in terms of trainability or behavior [8]. Perhaps due to insufficient statistical power, interventions were not different by any of the patient factors.

The significant range in patient visits parallels similar retrospective study in dogs and cats at the same institution [7]. The mean of three visits is consistent with an anecdotal recommendation that acupuncture be performed in this quantity to fully assess response [9]. It is possible that this bias skewed the value toward this number of visits rather than it being indicative of an average number of treatments truly required to address a clinical condition. Larger sample size would likely be required to identify the differences between visits according to presenting complaints, given

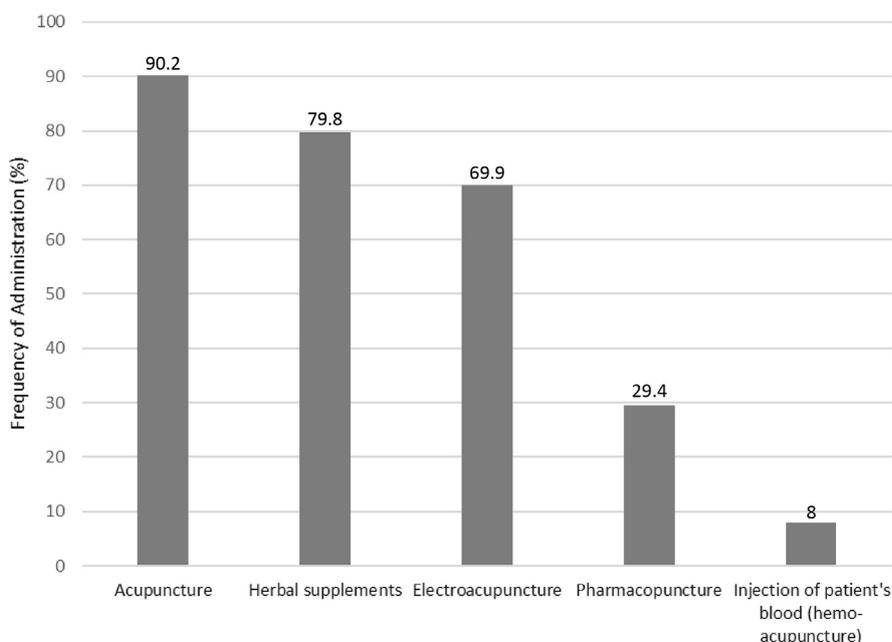


Figure 5 The frequency of acupuncture and/or herbal treatments of horses presented at an academic veterinary teaching hospital over a 3-year period from October 2012 to October 2015.

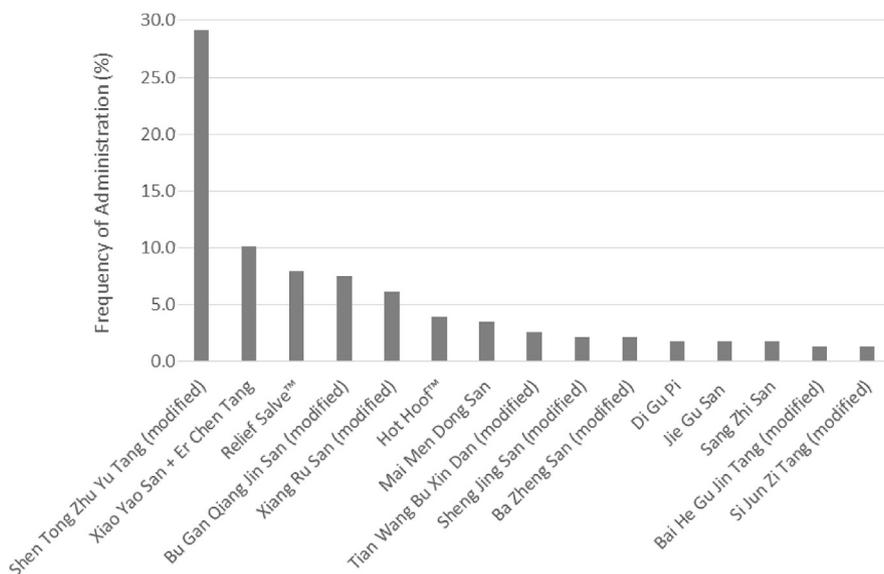


Figure 6 Most common herbal recommendations provided for horses, as a percentage of total herbal recommendations at an academic veterinary teaching hospital over a 3-year period from October 2012 to October 2015.

the wide range. Such information would be helpful, however, to provide treatment protocols to owners.

Musculoskeletal disorders comprised the majority of treatment indications, and previous studies largely examine the influence of acupuncture in this area [10–17]. There were a number of other conditions for which acupuncture and herbs were used, albeit at much lower rates. Additional information is necessary before these can be evaluated objectively. Preliminary data support a possible short-term effect of increasing sweat production in anhidrotic horses [18], and data for models of colic pain are mixed [19, 20].

The overwhelming predominance of classical needle acupuncture is consistent with prior reports in horses [2]

and in dogs [7]. Such an approach is documented in several experimental investigations [21, 22], while others used low-level electrical stimulation between acupuncture points in the theory of providing additional neural input and frequency-dependent endogenous opioids release [13, 19, 22]. The latter effects are reversible by naloxone and also transferrable between animals via cerebrospinal fluid, suggesting activity in the central nervous system [23]. The decision to use electrical stimulation is generally guided by a horse's temperament and the clinical indication. The strongest evidence supporting its use is for musculoskeletal conditions [9], but electroacupuncture is a modern invention and as such historical precedent is unavailable to guide

its application. The possible interactions of acupuncture on analgesic and inflammatory pathways in the horse are more extensively reviewed elsewhere [9].

The use of herbal supplements in four of every five cases deserves mention because fewer English-language publications are available for this aspect of TCVM than for acupuncture. Most of the herbs are administered as modifications of “patent formulas” derived from historical antecedents. The medical tradition within China relies heavily on herbal prescriptions [24], and this is an integral part of Chinese medical education [25]. Many equine-specific formulas were established in the 1600s in foundational equine medicine texts [26]. The basic nutrient profile of some of the more popular veterinary herbal combinations have been described [27], and a few studies evaluated clinical efficacy [28, 29]. Horses with gastrointestinal complaints in this study were less likely than those with musculoskeletal pathology to receive herbs. This may be due to the perceived potential gastrointestinal side effect profile of herbs, which is based on work in other species [30]. Nevertheless, a number of factors in the studied patients, inclusive of owner requests, clinician referral, and the frequency or feasibility of acupuncture, could have driven the high overall prevalence of herbal use. Moreover, the attending clinician has extensive training in Chinese herbal medicine and also is affiliated with a veterinary herbal supplier. Owners were, however, provided informed consent about this relationship and were given multiple manufacturers from which the product could be purchased to minimize conflicts of interest. The retrospective nature of this investigation precludes any definitive conclusions on the reason for the high rate of herbal utilization.

The two primary herbal formulas administered were one designed for gastrointestinal issues and stress and the other for antiinflammatory effects. Neither has been evaluated in randomized controlled trials in equine patients, but both were unremarkable in basic nutrient profile and heavy metal concentrations [27]. Constituent herbs within both formulas may exert clinical effects, and synergy of Chinese herbs within a formula has been reported [31]. The combination of Xiao Yao San and Er Chen Tang, administered for gastrointestinal complaints or stress, contains the herbs Angelica (Dang Gui), Bupleurum (Chai Hu), and Licorice (Gan Cao), which in animal models may show antiinflammatory, behavioral, and aldosterone-like effects, respectively [32]. As with most herbs, however, clinical effects in rodent models are often appreciated at very high doses not achieved in routine veterinary use. The possibility of drug–herb and herb–herb interactions cannot be predicted except by the practitioner’s experiential knowledge of herbal administration. The formula administered most commonly, Shen Tong Zhu Yu Tang, is interestingly a combination administered as an analgesic and antiinflammatory drug, which is noteworthy given the available pharmaceutical drugs licensed for this purpose. This formula contains Angelica (Dang Gui), Paeonia (Chi Shao Yao), and Myrrh (Mo Yao) which could theoretically, and at appropriate doses, have antiinflammatory effects consistent with its purported benefits [32]. In the absence of pharmacologic data on the combination formula in horses, the ideal dose, toxicity, and efficacy remain unknown. The frequency of use of both herbs merits additional investigations of both formulas.

The use of acupuncture and herbal medicine remains controversial [33]. There are significant aspects of both practices which lack high-quality scientific evidence [34, 35]. However, the same is true of many veterinary interventions, given a number of challenges in implementing ideal models of evidence-based medicine [36]. The use of acupuncture is generally regarded as safe, although potential side effects exist (needle site infection, needle fracture or migration, hemorrhage) even if not frequently reported. Herbal medications, containing potentially bioactive compounds, deserve additional research attention, given the possibility for both positive and adverse clinical effects. The present study provides a framework for prioritization of future research areas in field and also baseline data in a busy academic referral center for comparison with other practices and institutions.

Funding

No financial support to declare.

References

- [1] Bergenstrahle AE, Nielsen BD. Attitude and behavior of veterinarians surrounding the use of complementary and alternative veterinary medicine (CAVM) in the treatment of equine musculoskeletal pain. *J Equine Vet Sci* 2016;35(5):395. <https://doi.org/10.1016/j.jevs.2015.03.037>.
- [2] Hubbell JAE, Saville WJA, Bednarski RM. The use of sedatives, analgesic, and anaesthetic drugs in the horse: an electronic survey of members of the American Association of Equine Practitioners (AAEP). *Equine Vet J* 2010;42(6):487–93. <https://doi.org/10.1111/j.2042-3306.2010.00104.x>.
- [3] Angeli AL, Luna SPL. Aquapuncture Improves Metabolic Capacity in Thoroughbred Horses. *J Equine Vet Sci* 2008;28(9):525–31. <https://doi.org/10.1016/j.jevs.2008.07.023>.
- [4] Rizzo M, Arfuso F, Giannetto C, Giudice E, Longo F, Bruschetta D, et al. Acupuncture Needle Stimulation on Some Physiological Parameters After Road Transport and Physical Exercise in Horse. *J Equine Vet Sci* 2017;48:23–30. <https://doi.org/10.1016/j.jevs.2016.08.013>.
- [5] Rizzo M, Arfuso F, Giannetto C, Giudice E, Longo F, Di Pietro S, et al. Cortisol levels and leukocyte population values in transported and exercised horses after acupuncture needle stimulation. *J Vet Behav: Clin Appl Res* 2017;18:56–61. <https://doi.org/10.1016/j.jveb.2016.12.006>.
- [6] Rizzo M, Arfuso F, Giudice E, Abbate F, Longo F, Piccione G. Core and surface temperature modification during road transport and physical exercise in horse after Acupuncture needle stimulation. *J Equine Vet Sci* 2017. <https://doi.org/10.1016/j.jevs.2017.03.224>.
- [7] Shmalberg J, Memon MA. A Retrospective Analysis of 5,195 Patient Treatment Sessions in an Integrative Veterinary Medicine Service: Patient Characteristics, Presenting Complaints, and Therapeutic Interventions. *Veterinary Medicine International*; 2015.
- [8] Duberstein KJ, Gilkeson JA. Determination of sex differences in personality and trainability of yearling horses utilizing a handler questionnaire. *Appl Anim Behav Sci* 2010;128(1):57–63.
- [9] le Jeune S, Henneman K, May K. Acupuncture and Equine Rehabilitation. *Vet Clin North Am: Equine Pract* 2016;32(1):73–85. <https://doi.org/10.1016/j.cveq.2015.12.004>.

- [10] Shmalberg J, Xie H. Acupuncture and Chinese herbal medicine for treating horses. *Compend Contin Educ Vet* 2011;33(5): E1–11. Epub 2011/05/01. PubMed PMID: 23705162.
- [11] Klide A, Martin Jr B. Methods of stimulating acupuncture points for treatment of chronic back pain in horses. *J Am Vet Med Assoc* 1989;195(10):1375–9.
- [12] Le Jeune SS, Jones JH. Prospective Study on the Correlation of Positive Acupuncture Scans and Lameness in 102 Performance Horses. *Am J Trad Chin Vet Med* 2014;9(2):33–41. PubMed PMID: 97504791.
- [13] Xie H, Colahan P, Ott EA. Evaluation of electroacupuncture treatment of horses with signs of chronic thoracolumbar pain. *J Am Vet Med Assoc* 2005;227(2):281–6. <https://doi.org/10.2460/javma.2005.227.281>.
- [14] Xie H, Ott E, Colahan P, editors. Influence of acupuncture on experimental lameness in horses. Proceedings of the 47th Annual Convention of the American Association of Equine Practitioners; 2001.
- [15] Xie H, Ott EA, Harkins J, Tobin T, Colahan PT, Johnson M. Influence of electro-acupuncture on pain threshold in horses and its mode of action. *J Equine Vet Sci* 2001;21(12):591–600.
- [16] Tangjitjaroen W, Shmalberg J, Colahan PT, Xie H. Equine acupuncture research: an update. *J Equine Vet Sci* 2009;29(9): 698–709.
- [17] Xie H, Asquith RL, Kivipelto J. A review of the use of acupuncture for treatment of equine back pain. *J Equine Vet Sci* 1996;16(7):285–90.
- [18] Mallicote M, Medina C, Xie H, Zilberschein J, Atria S, Manzie M, et al. Acupuncture and herbal medicine used for treatment of anhidrosis. *J Vet Intern Med* 2013;27(3):656.
- [19] Skarda RT, Muir III WW. Comparison of electroacupuncture and butorphanol on respiratory and cardiovascular effects and rectal pain threshold after controlled rectal distention in mares. *Am J Vet Res* 2003;64(2):137–44. <https://doi.org/10.2460/ajvr.2003.64.137>.
- [20] Merritt AM, Xie H, Lester GD, Burrow JA, Lorenzo-Figueras M, Mahfoud Z. Evaluation of a method to experimentally induce colic in horses and the effects of acupuncture applied at the Guan-yuan-shu (similar to BL-21) acupoint. *Am J Vet Res* 2002; 63(7):1006–11. <https://doi.org/10.2460/ajvr.2002.63.1006>.
- [21] Wilson D, Lankenau C, Berney C, Peroni D, Mullineaux D, Robinson N. The effects of a single acupuncture treatment in horses with severe recurrent airway obstruction. *Equine Vet J* 2004;36(6):489–94.
- [22] Skarda RT, Tejwani GA, Muir III WW. Cutaneous analgesia, hemodynamic and respiratory effects, and β -endorphin concentration in spinal fluid and plasma of horses after acupuncture and electroacupuncture. *Am J Vet Res* 2002; 63(10):1435–42. <https://doi.org/10.2460/ajvr.2002.63.1435>.
- [23] Ulett GA, Han S, Han J-s. Electroacupuncture: mechanisms and clinical application. *Biol Psychiatr* 1998;44(2):129–38. [https://doi.org/10.1016/S0006-3223\(97\)00394-6](https://doi.org/10.1016/S0006-3223(97)00394-6).
- [24] Robinson N, Lorenc A, Ding W, Jia J, Bovey M, Wang X-m. Exploring practice characteristics and research priorities of practitioners of traditional acupuncture in China and the EU—A survey. *J Ethnopharmacol* 2012;140(3):604–13. <https://doi.org/10.1016/j.jep.2012.01.052>.
- [25] Hua M, Fan J, Dong H, Sherer R. Integrating traditional Chinese medicine into Chinese medical education reform: issues and challenges. *Int J Med Educ* 2017;8:126–7. <https://doi.org/10.5116/ijme.58e3.c489>. Epub April 13, 2017.
- [26] Yu B, Yu B. Yuan-Heng's Therapeutic Treatise of Horses (Yuan-Heng Liao Ma Ji). Beijing: China Agricultural Publishing House; 1963.
- [27] Shmalberg J, Hill RC, Scott KC. Nutrient and metal analyses of Chinese herbal products marketed for veterinary use. *J Anim Physiol Anim Nutr (Berl)* 2013;97(2):305–14. <https://doi.org/10.1111/j.1439-0396.2011.01271.x>. Epub 2012/02/01. PubMed PMID: 22289051.
- [28] Epp T, McDonough P, Padilla D, Cox J, Poole D, Erickson H. The effect of herbal supplementation on the severity of exercise-induced pulmonary haemorrhage. *Equine Comp Exerc Physiol* 2005;2(01):17–25.
- [29] Graham L, Farnsworth K, Cary J. The effect of yunnan baiyao on the template bleeding time and activated clotting time in healthy halothane anesthetized ponies. International Veterinary Emergency and Critical Care Symposium 2002, San Antonio, TX. *Advances in Veterinary Research—Equine Abstracts J Vet Emerg Crit Care* 2002;12:279.
- [30] Yu C, Trevisanello L, Shmalberg J, Xie H, Hernandez J. Case-control study of exposure factors associated with chinese herbal medicine treatment and gastrointestinal side effects in dogs. *Am J Trad Chin Vet Med* 2017;12(2).
- [31] Williamson EM. Synergy and other interactions in phytomedicines. *Phytomedicine* 2001;8(5):401–9. <https://doi.org/10.1078/0944-7113-00060>.
- [32] Chen JK, Chen TT. Chinese Medical Herbology and Pharmacology. City of Industry, CA: Art of Medicine Press; 2004.
- [33] McKenzie BA. Is complementary and alternative medicine compatible with evidence-based medicine? *J Am Vet Med Assoc* 2012;241(4):421–6. <https://doi.org/10.2460/javma.241.4.421>.
- [34] Arlt S, Heuwieser W. Evidence-based complementary and alternative veterinary medicine—a contradiction in terms? *Berl Munch Tierarztl Wochenschr* 2010;123(9-10):377–84. Epub 2010/11/03. PubMed PMID: 21038809.
- [35] Habacher G, Pittler MH, Ernst E. Effectiveness of Acupuncture in Veterinary Medicine: Systematic Review. *J Vet Intern Med* 2006;20(3):480–8. <https://doi.org/10.1111/j.1939-1676.2006.tb02885.x>.
- [36] Vandeweerd JM, Kirschvink N, Clegg P, Vandenput S, Gustin P, Saegerman C. Is evidence-based medicine so evident in veterinary research and practice? History, obstacles and perspectives. *Vet J* 2012;191(1):28–34. <https://doi.org/10.1016/j.tvjl.2011.04.013>. Epub 2011/05/31. PubMed PMID: 21620746.