Stretching Exercises for Horses: Are They Effective?

Ava Frick, DVM, CAC

ABSTRACT

This article aims to present research in both animals and humans that support the use of stretching exercises in horses as a means of increasing range of motion, improving body flexibility and posture, and preventing injury by strengthening the supportive tissues. Too often veterinarians may overlook the importance of stretch exercises. This could partially be due to a lack of familiarity of what type of exercises to recommend, how to perform them, or where to obtain the desired information. Studies demonstrate the beneficial effects of stretching, warm-up, and temperature on the mechanical properties of muscle, potentially reducing the risk of strain injury to muscles. Evidence demonstrates that various approaches to conditioning that include warm-up and stretching along with other techniques such as strength training and proprioceptive training enhance performance and prevent certain types of injury. In addition, stretching of specific muscles and articulations for specific activities might enhance the effectiveness of these other pre-exercise activities, which is consistent with a multifactorial model for injury prevention. Stretches are either dynamic (having motion) or static (having no motion). Dynamic stretching involves moving parts of the body and gradually increasing reach, speed of movement, or both. It is controlled movement or swings that gently take the limb to the limits of range of motion. Static stretching consists of stretching a muscle (or group of muscles) to its farthest point and then maintaining or holding that position. Passive or relaxed and isometric stretching are both types of static stretches. Passive or relaxed is where a position is maintained by holding it with some other part of your body, or with the assistance of a partner or some other apparatus. This type of stretching is the most common type used with stretching exercises in horses as we control the motion and positioning desired. Slow, relaxed stretching is useful in relieving spasms in muscles that are healing after an injury. Relaxed stretching is also good for "cooling down" after a workout and helps reduce postworkout muscle fatigue and soreness. A case study and an example of a stretch exercise program and what to look for in a "how to" guide is also presented.

Keywords: Stretching; Flexibility; Exercises; Muscle fatigue; Range of motion (ROM)

From the Animal Fitness Center, PC, 1841 Denmark Road, Union, Missouri.
Reprint requests: Ava Frick, DVM, CAC, Animal Fitness Center, PC, 1841 Denmark Road, Union, MO 63084-4429.
0737-0806/$ - see front matter

doi:10.1016/j.jevs.2009.12.001

INTRODUCTION

Stretching is a common practice before participation in human sports and competitive activities. Athletic directors, physical therapists, coaches, and trainers recommend exercise programs that include stretching in an effort to improve flexibility, relieve pain, prevent injury, and enhance performance. Flexibility (lack of tightness) is an intrinsic property of the body tissue that determines the absolute ROM in a joint or series of joints that is attainable in a momentary effort with the help of a partner or piece of equipment. It is specific to the type of action performed at the joint.[1]

Static flexibility of a joint is measured by tools such as a goniometer, and is reported as degrees of ROM, commonly of flexion or extension.[2] The improvement of short-term flexibility that results from stretching has been documented.[3-7] Dynamic flexibility is the ability to perform dynamic (or kinetic) movements of the muscles to bring a limb through it a full ROM in the joints. This is seen when a can-can dancer swings her leg around from the hip and then twirls the knee. Active flexibility is the ability to assume and maintain extended positions using only the tension of the agonists and synergists while the antagonists are being stretched. An example here is the splits. Passive flexibility is the ability to assume extended positions and then maintain them using only your weight, the support of your limbs, or some other apparatus.[1] With horses this would be your support aiding the stretch of a leg.

Stretching exercises are designed for athletes to target specific body regions or tissue related to sporting activities based on the joints and muscles most commonly affected. Availability of this information has led veterinarians, therapists, horse owners, trainers, and riders to use stretching exercises with similar reported benefits for their horses.

Some benefits include regaining proper balance (right to left and front to rear proportions), flexibility, and body awareness, proprioception, or limb placement.[7] Proprioception can improve with exercises and stretching specifically designed to stimulate the central nervous system's primary input fields such as the mental status and sensory input from the surroundings along with the body's relationship in space to that environment. In addition, stretching of specific muscles and joints for specific activities might enhance the effectiveness of other pre-exercise activities (eg, in horses these could be lounging, bringing the head around while in the saddle, walking, and loping as a warm-up), which is an approach consistent with a multifactorial model for injury prevention.[8]

Evidence demonstrates that stretching increases flexibility and might improve performance or decrease the risk of injury.[3,6,9] Compared to control study groups those that performed stretching exercises had an increase in ROM and stretch tolerance after 4 weeks of stretching, with no change in muscle stiffness, work absorption, or delayed onset muscle soreness. After eccentric exercise, they also had greater ROM and stretch tolerance.[10]

The purpose of this manuscript is to discuss the following issues.

1. Review of literature and proposed mechanism of action to assess whether stretching can actually improve ROM and prevent injury.
2. What evidence exists that stretching can relieve pain?
3. When are stretching exercises appropriate?
4. What types of stretching exercises are appropriate for horses?
5. Provide an example of a stretching exercise protocol.

REVIEW OF MECHANISMS OF ACTION

Stretching increases the joint ROM through increases in the compliance and decreases in the viscoelasticity of resting muscle.[5,6,11-14] Compliance is the willingness of tissue to lengthen with very little force and is the reciprocal of stiffness. Compliance is most necessary during the active phase of muscle contraction as that is when most injuries occur.[11,12,13,15,16]

Viscoelasticity refers to the presence of both elasticity and viscous behavior. An elastic substance will exhibit a change in length for a given force, and will return to its original length immediately on release. The effect is not time dependent. A viscous substance exhibits flow and movement that is time-dependent. With a viscous substance the length continues to increase slowly with a constantly applied force. Stretch relaxation occurs when the length is held constant but the measured force on the tissue slowly decreases and when the force is removed the object returns to its original length.[6,11,12,17]

The beneficial adaptation to stretching has been most frequently credited to stretch reflex mechanisms and viscoelastic properties of the muscle. Viscoelasticity as visualized by experiments, including computed tomography and magnetic resonance imaging, have shown that injuries occur at the muscle–tendon junction and that repetitive stretching reduces the load on the muscle–tendon unit at any given length. A large component of the changes seen in muscle due to stretching is a result of inherent muscle–tendon viscoelasticity.[13]

Stretching affects not only muscle but tendons and connective tissue as well. The immediate effects of a single stretching session produce a decrease in viscoelasticity and an increase in stretch tolerance. Stretching over a longer period of time primarily affects stretch tolerance and regular stretching may induce muscle hypertrophy.[9,12,17]

Rabbit and quail research has shown that normal muscles stretched for 24 hours per day for several days will actually increase in cross-sectional area, even though they are not contracting.[9,17,18] This is known as stretch-induced hypertrophy. Other rat studies have looked at both continuous and intermittent stretching as factors that could theoretically reduce the risk of injury.[19] Muscles stretched continuously for 24 hours per day over varying intervals exhibited stretch-induced hypertrophy. A mouse study where shorter times of only 2 min/d of stretching were applied to the long digital extensor muscle after an induced injury lacked the previous results.[12]

Based on these studies it appears that the possibility that some hypertrophy will occur in healthy muscle if a longer period of stretching is applied. In humans, stretching alone on a regular schedule over weeks, even on days when not exercising, has shown to improve tests of maximal voluntary contraction, jumping height, and, in some, running speed.[20]

Muscle strain occurs when muscle is elongated passively beyond its anatomical limits or activated during stretch.[13,15,16] This is eccentric contraction. Eccentric contraction of the muscle contributes to injury by generating high muscle forces during lengthening, exceeding the forces produced by the passive connective tissue elements. Eccentric contraction occurs when the force generated is insufficient to overcome the external load on the muscle and the muscle fibers lengthen as they attempt to contract. An example of eccentric contraction is weight lifting on a bench press with fatigued or overloaded muscles and the weight is slowly lowered during maximal effort or muscle contraction.

Muscle strain, as documented in a series of rabbit hind limb studies, is characterized by a disruption of the muscle tendon unit and is due to eccentric contraction. Eccentric contractions generate high forces but activate few motor units.[13] The extent of muscular injuries in these studies was closely related to the stretch rate. An injury could occur if the stimulated muscle was stretched to failure even once.[15] The findings suggest that eccentric contractions cause profound changes in the muscular parenchyma and that they may be the result of mechanical trauma caused by the high tension generated in a relatively few active fibers during eccentric contractions. Sometimes this can occur within the physiologic range.[15]