Journal of Acupuncture and Meridian Studies 2022;15(4):201-213
pISSN 2005-2901 • eISSN 2093-8152
https://doi.org/10.51507/j.jams.2022.15.4.201

PERSPECTIVE ARTICLE

Correlation Between the Sinew Channels with the Myofascial System, Pathology, and Treatment

Pablo Nava Jaimes*, Alejandro Martínez Reyes, Daniel García Lara, Abel Cristian Patiño Coyuca

State University of the Toluca Valley, Ocoyoacac, Mexico

Received July 8, 2021
Revised March 8, 2022
Accepted April 25, 2022

Correspondence to
Pablo Nava Jaimes
State University of the Toluca Valley, Ocoyoacac, Mexico
E-mail pablonaja2104@gmail.com

The sinew channels are a tendon and muscle network, and their description is based on the observation presented on the Huangdi Neijing Ling Shu. However, the myofascial system is an uninterrupted series of connective tissue that is comprised of layers that run in different directions. The similarities on these pathways are compared, such as a brief description on the myofascial pain syndrome and its similitude with the Impediment disorder from the Traditional Chinese Medicine (TCM). Furthermore, we discuss the treatment of these conditions from a Traditional Chinese Medicine perspective.

Keywords: Sinew channel, Myofascial system, Myofascial syndrome, Impediment disorder, Bi syndrome, Cupping therapy, Gua Sha

INTRODUCTION

The sinew channels (SC) are a three-dimensional network which, as the name suggests, are made up of muscles and tendons throughout the body, and these SC have points of convergence that are described as the insertion of muscles. The description of SC is based on empirical observations that have been described in the Huangdi Neijing Ling Shu, wherein the anatomical and functional structures of the human body are described. Each SC is connected to at least one other SC, and this has implications for the regulation of Qi. The SC perform structural, biomechanical, integrative, and defensive functions, as they are responsible for maintaining energy homeostasis against external influences [1].

From a biomedical perspective, the SC manifests a clear resemblance to the myofascial system, which can be defined as an uninterrupted series of fibrous connective tissue that are formed by layers in an oblique, transverse, circular direction which allows the distinguishing of three types of layers: superficial, deep, and visceral. The SC comprises tissues that are capable of responding to the mechanical stimuli that it receives and transmits mechanometabolic information, which influences the form and function of the whole body [2].

The main functions of the SC include the protection of the osteomyoarticular system; integration of synergistic movements between muscle groups; lining of structures such as muscles, neurovascular bundles, or even joints; and hemodynamic coordination. The continuation of the fascia is the result of the evolution of a synergy between different tissues, liquids, and solids that is capable of supporting, penetrating, dividing, and connecting all regions of the body [3,4].

According to Gianluca Bianco [5], the SC tissue has neuromodulating properties that, through the mechanical stimuli of free nerve endings, connect to deeper tissues and regulate the homeostasis through correction of the relations between the sympathetic and parasympathetic nervous systems.

When anatomical pathways are sought, contiguous lines consisting of connective or myofascial tissue are obtained, although some pathways only show continuity in specific situations, such as posture, specific activity, established direction, depth, and mechanical or direct connections. Thomas W. Myers [6] described myofascial pathways or lines that maintain a close resemblance with the SC that was described in the theory of channels and collaterals, which have been explained by authors such as Li Ping [7], where both pathways have a close relationship in their paths around the body. Peter T. Dorsher [8,9], in his paper "*Myofascial meridians as anatomical evidence of acupuncture channels*," reported evidence for an 89% rate of similarity between the main acupuncture channels and myofascial chains. Both from the personal and professional perspectives, we consider it interesting and, probably, rather suitable to compare the pathways of SC to the myofascial system instead of the main acupuncture channels, when considering that the former have a closer similarity from a functional point of view, whereas

the main acupuncture channels have an utterly different function in the context of traditional Chinese medicine (TCM).

In this article, we describe the myofascial pathways individually based on the descriptions presented by Myers [6] in his work "Anatomical Pathways. Myofascial Meridians for Manual and Movement Therapists," in juxtaposition with their corresponding SC within the TCM theory of channels and collaterals.

SUPERFICIAL BACK LINE (SBL)

The SBL connects and protects the entire posterior aspect of the body—from the sole of the foot to the top of the head. The postural function of the SBL is to support the body in full vertical extension, which implies that there are more muscle fibers in this pathway. The general movement function of the SBL consists of extension and hyperextension, except at the knees.

The starting point of the SBL pathway is the surface of the distal phalanges of the toes, and the SBL runs along the underside of the foot, extending from the plantar fascia to the calcaneal tendon and further reaching into the gastrocnemius and the femoral condyles, and continuing through the hamstrings to reach the ischial tuberosity, which forms part of this line at the sacrotuberous ligament and the sacrum. The SBL ascends through the thoracolumbar fascia and erector spinae muscle, reaches the occipital crest, penetrates the aponeurotic galea, and terminates in the superciliary arch of the temporal bone.

The SBL has some similarity with the SC of the Urinary Bladder, which arises from the nail angle of the fifth toe. At the level of the external malleolus, it divides into three branches: the first branch inserts on the external aspect of the calcaneus and branches again at the heel; the second follows the external aspect of the leg and reaches the head of the fibula; and the third joins the calcaneal tendon, and then ascends and inserts into the base of the gastrocnemius, before continuing its ascent along the posterior aspect of the leg to the popliteal fossa, where it ascends to the gluteal fold, joins the paravertebral muscles until the base of the neck, continues along the epicranial aponeurosis and frontalis muscle, and terminates at the ala of the nose. Along its dorsal course, it extends two branches: the first at the level of the seventh and eighth thoracic vertebrae that bifurcates and passes through the tip of the scapula toward the clavicle, before ascending and terminating at the posterior border of the auricle. The other branch crosses the scapula along the lateral border of the scapular spine, where it releases another branch toward the supraclavicular fossa and the neck before finally branching into the base of the tongue. From the neck, it ascends to the maxilla and ends at the internal canthus of the eye (Fig. 1).

SUPERFICIAL FRONT LINE (SFL)

The SFL connects the entire anterior surface of the body, and its postural function is to provide support from the head to the axial skeleton, while maintaining the postural extension of the knees. The SFL's function, in terms of movement, is to modulate the flexion of the trunk and hip, knee extension, and dorsiflexion of the foot. This line provides protection to the viscera and ventral cavity through the muscles of the pathway.

The SFL originates in the dorsum of the foot and merges with the SBL in the periosteum of the phalanges before ascending along the anterolateral zone of the leg until the pelvis, where it derails in the superior part of the rectus femoris; at this point, the continuity is broken because an anatomical connection does not exist, and therefore the SFL makes a jump to surpass the pubis. Thus, although there is no myofascial continuity, there is mechanical continuity. Once in the superior part of the pubis, the SFL ascends over the abdominal fascia; which surrounds the rectus from the obliques to the costal grill, continues at the level of the fifth intercostal space up to the sternal fascia, where it passes through the sternocleidomastoid, ascends laterally and posteriorly toward the mastoid process of the temporal bone and lateral parts of the aponeurotic galea, and, within the skull, the SFL covers up to the asterion.

The SFL is similar to the Stomach SC, which begins its course in the extremity of the second to fourth toe, crosses the dorsum of the foot, and inserts into the center of the ankle,

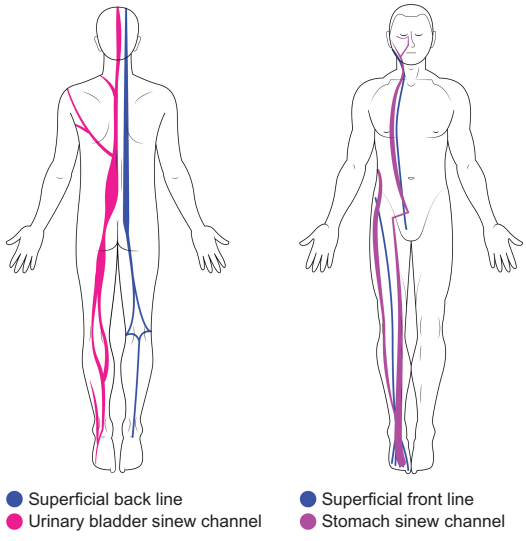

Fig. 1. Comparison between the superficial back (SBL) and front lines (SFL) and their respective sinew channels.

where it bifurcates; thereafter, the external branch ascends obliquely along the fibula, ascends via the anterolateral portion of the quadriceps to the hip, where it inserts and crosses the flank up to the spine. The internal branch ascends vertically along the anterior aspect of the leg along the tibial crest to the knee and inserts below the patella; from there, a collateral branch emerges that will join the upper part of the fibula to connect with the external branch and with the Gallbladder SC. The internal branch continues its course by passing through the anterior aspect of the thigh, inserts into the groin crease, and ascends along the anterior internal abdominal and thoracic wall to the supraclavicular fossa, ascends along the anterior aspect of the neck to the angle of the lower jaw, where it divides into two branches: one of the branches goes to contour the mouth, joins the nose, and branches into the lower eyelid, and the other branch ascends in front of the ear and then enters the zygomatic region (Fig. 1).

LATERAL LINE (LL)

The LL supports each side of the body and performs a postural function to balance the anterior and posterior part of the body as well as the bilateral right and left sides while fixing the trunk and lower limbs in a coordinated manner. In its movement function, the LL participates in the lateral inclination of the body, lateral flexion, hip abduction, and eversion of the foot, as well as in trunk rotation.

The LL starts at the metatarsal joints of the first and fifth metatarsals, runs laterally along the sole of the foot, from where it is directed upward to reach the lateral compartment of the leg. Thereafter, the LL continues along the iliotibial tract to reach the greater trochanter of the femur, where it becomes incorporated into the tensor fascia lata and the gluteus maximus. These fasciae insert into the anteroposterior iliac spine, where a digression is present and the rules of the anatomical pathways are broken to create a lattice from the iliac spine, wherein there is an accumulation of connective tissue. Continuing with the posterior fibers of the external oblique, in the abdomen the LL is directed upward and backward and, in its path along the trunk, the LL follows an oblique direction to form an "X", where it continues to the rib cage through the insertion of the floating ribs and then ascends to reach the first ribs and the base of the neck. From this point, the "X" pattern is repeated in an ascending form where the LL mediates the splenius and sternocleidomastoid muscle before ascending laterally to the auricular region.

The LL is related to the Gallbladder SC, which originates in the fourth toe, inserts into the external malleolus, ascends to the external aspect of the leg, and reaches the external aspect of the knee. From the knee, the LL ascends along the thigh and reaches the greater trochanter, where it generates a branch toward the external border of the sacrum. Another branch emerges a little above the external femoral condyle, runs obliquely upward and forward, and then inserts into the symphysis pubis. From the hip, the LL channel ascends and reaches the hypochondrium until the floating ribs, where it gives rise to two branches: the first branch ascends the lateral aspect of the thorax and inserts into the middle of the supraclavicular hollow. The second branch follows the axillary line and joins the first branch in the supraclavicular fossa before ascending along the lateral aspect of the neck to reach the parietal region, where it branches to descend toward the mid-maxillary region, before ascending again to the zygomatic process, where it divides into two new branches: one of the branches inserts into the nose and the other inserts into the lateral canthus of the eye (Fig. 2).

DEEP FRONT LINE (DFL)

The DFL is interposed between the right and left lateral lines in the frontal plane, intercalating the SFL and SBL in the sagittal plane. Thus, the DFL plays an important role in body posture, elevating the foot arch, stabilizing the lower limbs, supporting the lumbar spine and thorax, and maintaining the balance of the neck and head. No movement, except hip adduction and diaphragmatic breathing, escapes the influence of the DFL.

This pathway begins in the deep plane of the sole of the foot, on the plantar aspect of the tarsus, ascends along the internal face of the ankle behind the malleolus and the talus, before continuing its route in the posterior plane of the leg, and then ascending along the medial region of the knee joint

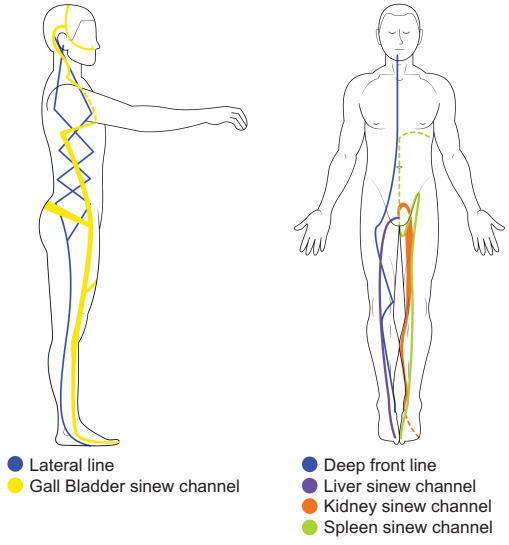

Fig. 2. Comparison between the lateral (LL) and Deep front (DFL) lines and their respective sinew channels.

and the medial condyle of the femur. This fascia will follow different directions to meet at the lumbar spine, and these two continuities are called the posteroinferior pathway and anteroinferior pathway.

The posteroinferior pathway is formed by the adductor magnus, which is the posterior part of the ischial branch. This pathway follows the portions of the levator ani, up to the coccyx, continues with the sacral fascia, which is directed to the anterior longitudinal ligament (ALL) that will ascend through the anterior region of the spine to merge with the anteroinferior pathway; thus, this fascial pathway begins in the thigh through the anterior region of the hip, to the vertebral bodies of the lumbar one and thoracic twelve segments. From the lumbar spine, the pathway continues its descent through the lumbar vertebrae to the sacral fascia, heading toward the symphysis pubis, then follows the rectus abdominis wherein the fascia ascends to the pelvic diaphragm, passes through the navel, and then connects with the rib cage. After the thorax has been reached, one of the three ascending pathways of the DFL will be formed; thereafter, the posterosuperior pathway continues its ascent along the diaphragm, where a deep posterior line will be traced, following the ALL, before ascending along the spine to the base of the occipital bone. The mid-superior pathway includes fibers from the diaphragm during its ascending course, meets the ALL on the anterior surface of the thoracic vertebrae, and reaches the lower cervical vertebrae such that the fibers come into contact with the posterior line that corresponds to the ALL and longus muscle of the head. The third pathway is the anterosuperior line, which follows the curvature of the diaphragm, emerges from the thoracic cage behind the sternal manubrium, and continues to the hyoid. From this point, the pathway connects with the temporal process before reaching the chin and mastoid process, along the aponeurotic galea, which forms a part of the SFL, SBL and LL.

The DFL presents a great similarity with the SC of the Kidney, Spleen, and Liver that converge with each other.

The SC of the Kidney starts at the base of the fifth toe, crosses the sole of the foot, and inserts into the internal malleolus from where a branch arises that will penetrate the internal aspect of the calcaneal bone. This SC then ascends along the postero-internal aspect of the leg up to the internal condyle of the tibia and merges with the MT of the bladder before ascending the postero-internal aspect of the thigh. The SC then inserts into the external genitalia, where it joins the Splenic SC, which penetrates the abdomen and ascends along the anterior aspect of the spine to the base of the skull. A branch from the genital region that outlines the gluteal area on the inside and follows the spine to the nape of the neck once again joins with the SC of the Urinary Bladder until it reaches the occipital bone.

The Splenic SC arises from the first toe and the first metatarsal, inserts into the internal malleolus, and follows the internal part of the leg up to the pubis, ascends to the umbilical scar, which it penetrates to ascend to the sternum, dispersing in the costal grid on the internal aspect and following the dorsal vertebrae. Finally, the SC of the Liver, which is the shortest of the SCs, starts in the first toe and inserts in front of the internal malleolus, before ascending the entire medial aspect of the leg up to the genital organs (Fig. 2).

ARM LINES

The myofascial lines of the upper limb are named according to their position as they pass through the shoulder; thus, the four lines will be described according to their position and depth and perform a postural function: the tension from the elbow influences the mid-spine, and they act through 10 joints of the upper limb to generate movement. These lines or pathways coordinate with each other for the limb's movements.

The deep front arm line (DFAL) originates in the clavipectoral fascia that begins in the anterior region of the ribs between the third and fifth ribs, along the pectoralis minor. Continuing through the coracoid process via the short head of the biceps brachii, the line continues through the coracobrachialis and the supinator before inserting into the radius following the periosteum until it reaches the distal edge of the radial styloid process. From there, the DFAL includes the radial collateral ligament over the carpal bones on the thumb side and the scaphoid to the thumb itself, thus concluding the trajectory.

This line has a similarity with the SCs of the Heart and Lung. The SC of the Lung starts at the thumb, crosses the thenar eminence, and ascends to the wrist through the Yin area of the forearm. The Lung SC inserts in the center of the elbow and follows the antero-inner border of the arm, continues on the anterior aspect of the shoulder, enters under the pectoral to reach the supraclavicular hollow, before inserting into the anterior aspect of the shoulder. Thereafter, the SC returns toward the supraclavicular hollow, enters the axillary region, before penetrating the thoracic region which covers the mediastinum and diaphragm, and terminates by dispersing into the costal cage (Fig. 3).

The superficial front arm line (SFAL) covers the DFAL at the shoulder, with which it shares an origin. The pectoralis major and set of insertions that extend from the clavicle to the mid ribs provide an origin to this line in the anterior region; moreover, the insertion of the latissimus dorsi is on the surface of the humerus next to the insertion of the pectoralis major and this forms a part of this line, before descending

to the medial epicondyle of the humerus, joining different longitudinal layers of extensor muscles of the forearm, and heading toward the carpus; simultaneously, the superficial flexor muscles are directed to the area of the fingers and reach the fingertips.

This line is related to the Pericardium SC.

The SC of the Pericardium, which arises at the tip of the middle finger, crosses the palmar muscles to reach the wrist crease and ascends along the inner side of the forearm to reach the elbow on the ulnar side of the biceps tendon, before following along the inner side of the arm up to the axilla. The SC then penetrates the interior of the thorax and branches off at the costal cage where it joins the diaphragm and cardia (Fig. 3).

The deep back arm line (DBAL) originates at the spinous processes of the last cervical and first thoracic vertebrae, from where it runs to the medial border of the scapula, which it surrounds with the rotator cuff. The DBAL bifurcates in the lateral occipital area and descends along the levator scapulae from the transverse processes of the first four cervical vertebrae. The distal end is the superior angle of the scapula to the top of the humeral head. The DBAL starts from the triceps brachii from where it connects with the anconeus to the apex of the elbow, from where it extends through the ulnar periosteum to the ulnar styloid process, the pyramidal and hook bones, up to the edge of the little finger. It should be noted that the hypothenar muscles belong to this pathway.

The relation of the DBAL pathway is with the SC of the Heart and Small Intestine. The SC of the Heart starts on the internal side of the little finger, crosses the hypothenar eminence, before arriving in the pisciform area and follows the internal posterior border of the forearm before inserting itself in the epitrochlear area. Then, the SC ascends through the arm up to the axillary hollow, from where it passes to the torso by crossing the SC of the Lung, covering the breasts and the whole thoracic cage, before descending through the diaphragm covering the cardia until it reaches the umbilical scar, and then further descends through the abdominal rectus in the medial fibers (Fig. 4).

Simultaneously, the SC of the Small Intestine begins its course in the ulnar portion of the little finger, follows the ulnar border of the fifth metacarpal, and then inserts itself in the wrist and continues along the external border of the forearm until it reaches the elbow. Then, this SC inserts into the posterior aspect of the axillary hollow and divides into two branches: one surrounds the scapula and the other branches off at the shoulder and ascends the lateral aspect of the neck, where it divides into two more branches: the posterior branch inserts into the mastoid process, where a branch arises to penetrates the ear, contours the ear from behind, and descends the cheek before ascending to the vertex of the eye, where it inserts and reaches the frontoparietal angle; the anterior branch runs from the neck to the maxillary angle, crosses the zygomatic area, and inserts into the lateral canthus of the eye.

The superficial back arm line (SBAL) arises from the band of axial insertions of the trapezius from the occipital to the spinous process of the second thoracic, runs from the posterior region of the skull past the anterior aspect of the shoulder to the posterior region of the upper limb, passes under the anterior brachialis muscle to blend with the fibers of the lateral intermuscular septum; the SBAL descends to its distal insertion on the lateral epicondyle of the humerus, and

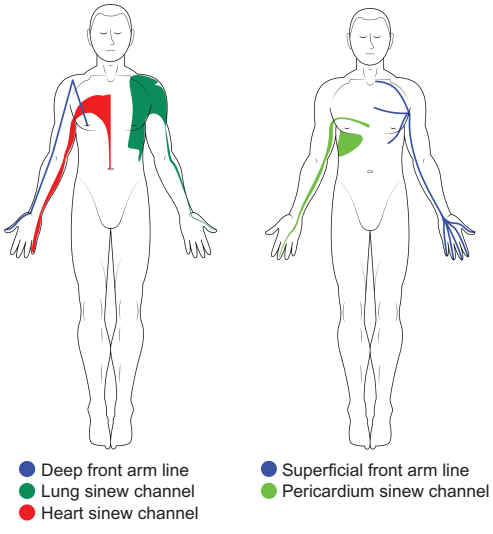

Fig. 3. Comparison between the deep front (DFAL) and superficial front (SFAL) arm lines and their respective sinew channels.

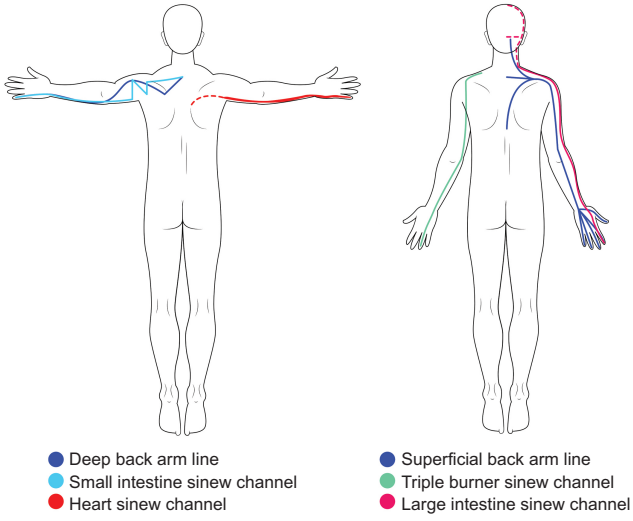

Fig. 4. Comparasion between the deep back (DBAL) and superficial back (SBARL) arm lines and their respective sinew channels.

the line continues over the common tendon, to incorporate into the longitudinal muscles that are arranged behind the radius–ulnar interosseous membrane complex, before passing the dorsal retinaculum to the carpus and fingers.

This pathway is similar to the SCs of the Large Intestine and Triple Burner.

The Large Intestine SC starts by ascending between the thumb and index finger, inserts into the anatomical snuffbox, and follows the outer side of the forearm. This SC inserts at the outer edge of the elbow and follows the radial edge of the arm to the shoulder, and then connects to the outer extremity of the acromion to emit a branch that contours the scapula to reach the first six thoracic vertebrae. The pathway continues from the shoulder to the neck and inserts at the angle of the lower jaw. From there, two branches arise: the first branch extends off to the side of the nose whereas the second branch reaches the frontoparietal region and contours the head, before terminating in the area of the contralateral side of the lower jaw.

Furthermore, the SC of the Triple Burner begins its course in the ring finger, continues along the dorsal side of the hand between the fourth and fifth metacarpal, and inserts into the center of the wrist before ascending along the forearm between the ulna and radius until it reaches the elbow, and then inserts into the posterior border of the acromion. This SC then ascends the lateral aspect of the neck and joins the SC of the Small Intestine, where it divides into two branches: the first branch goes to the maxilla and joins the root of the tongue, whereas the second branch ascends in front of the auricular pavilion, along the ascending branch of the maxilla, reaches the external commissure of the eye, and then terminates in the frontoparietal region (Fig. 4).

Nonetheless, there are certain anatomical variations between the SC and the myofascial lines, and the paths are not exact; however, there is an undeniable similarity between the SCs. There are many variables that can modify the myofascial pathways including age, sex, and ethnicity. This article merely aims to describe the similarities between the SCs and to propose a common ground between the two pathways.

MYOFASCIAL PAIN SYNDROME

This non-inflammatory disorder is defined as a set of sensory, motor, and autonomic symptoms, composed of three basic elements: a palpable band in the affected muscle, a trigger point, and referred pain pattern [8].

Within its pathophysiology, both local and systemic mechanisms are described, which may be involved in the pathology including trauma, ischemia, and overuse. These triggers produce tissue damage, which releases neurovasoactive substances that sensitize local nociceptors, with muscle spasm being the first outcome, in addition to hyperalgesia caused by the increased response of nociceptive cells [10]. The resulting muscle contraction can alter arterial flow and the supply of oxygen, calcium, and other nutrients that are needed to induce muscle relaxation. Local energy demands, owing to the effect of sustained acetylcholine release, depolarization, and sustained contraction, produce a rapid local depletion of adenosine triphosphate, which implies a metabolic failure that is referred to as an energy crisis [11].

Another relevant cause of myofascial pain is psychological factors, which includes prolonged periods of stress, depression, and sleep disturbances. These changes produce alterations in the muscle groups, and this translates into hyperirritability. However, relative ischemia, which can be an important factor in the development of the tight band, and the continued shortening and spasm of the contractile unit can damage the affected tissues. Under these conditions, the synthesis and release of inflammatory substances (bradykinin, noradrenaline, IL-1b, histamine, prostaglandins, substance P, and calcitonin gene-related peptide) would occur, and some of these substances act as acetylcholinesterase inhibitors, which results in an increased acetylcholine release in the motor plate [12]. This increase, given an acidic environment, activates muscle nociceptors and increases activity in the motor plate, with the consequent onset of pain. This is known as peripheral sensitization, and causes muscle spasm. Continued stimulation of nociceptors can activate neighboring nociceptors as well as even second- or third-order neurons to cause central sensitization, which may be responsible for the referred pain [13].

For an accurate diagnosis, physical examination and clinical history are the basic elements. In addition to these criteria, it is important to consider nodules on a tense and palpable band, lancinating pain when pressing on myofascial trigger points, decreased range of motion of the involved joint segment, and hyperesthesia and/or allodynia in trigger point areas. In addition, there is a jump sign, which is an involuntary reflex of the patient, disproportionate to the pressure applied on the trigger point [10,12].

The physiotherapeutic treatment should be individualized for each patient while taking into account the factors that trigger the condition. This consists of two important factors: pain control and muscle reconditioning, where the following techniques can be used.

1. Manual therapy: passive soft-tissue mobilizations, transverse friction massage, passive stretching, and ischemic compression.

2. Physical agents: electrotherapy, thermotherapy, laser, therapeutic ultrasound, and sonophoresis [14].

SC IN TCM

Unlike the remaining regular meridians (or channels), the SCs do not have a proper function of transporting the vital energy of the organs similar to that with the regular meridians. Although they have more to do with muscles and tendons than with the internal organs, their functions go beyond just participating in limb movements.

Just as the similarities between SC trajectories and myofascial chains have been briefly described, authors such as Giovanni Maciocia [15] have described extremely similar functions between these two systems:

- Trauma protection
- Maintenance of the standing position
- Unification of the "hundred bones" (cohesion of the skeleton and its associated structures)
- Enabling and assisting in movement
- Integration of the surface and the interior of the body

We can note that, although they are not assigned a function that is associated with the internal organs, to which they are associated, their usefulness goes beyond movement. It should be noted that even when they are associated with the regular meridians, or main channels, the SCs have no influence on the functioning of the internal organs; however, the paths and functioning of the SCs do depend on the health of the internal organs. Therefore, the affectation of a SC will not directly influence the well-being of an organ or viscera, but an injury to these SCs can be reflected in the symptomatology of muscles and tendons. For example, in the case of musculoskeletal pain, the origin of this pain will often be trauma, but factors such as Liver or Kidney deficiencies will predispose the individual to present some type of injury [16]. In other words, the SCs do not influence the state of the internal organs, but the internal organs will influence the state and health of the SCs.

Just as myofascial chains have histological nodes wherein different chains converge [6], the SCs have points where they are grouped, and these are called meeting points [15]. There are four meeting points that organize the channels according to their polarity (Yin or Yang) and, regardless of whether they are part of the arm or leg, they result in each point grouping into three channels. These are:

- Zhongji RM3 for the three leg Yin channels (Ki, Sp, Li)
- Quanliao SI18 for the three Yang channels of the leg (BL, St, Gb)
- Touwei ST8 for the three Yang channels of the arm (SI, LI, TB)
- Yuanye GB22 for the three Yin channels of the arm (He, L, Pc)

The anatomical location of these points is similar to the convergence points of different myofascial chains. In the TCM context, these points exert a function of exchange and facilitators of the energetic flow between the different energetic planes (Yang Ming and Tai Yang, for example) as well as a function within the treatment of pathologies that affect the TMs.

SC AND PATHOLOGY

As described above, SCs have no influence on the state of the internal organs, therefore, from a therapeutic perspective, their usefulness is reduced to their application in the treatment of musculoskeletal conditions, such as in the case of Impediment disorder (Bi syndrome).

Strictly, the Impediment disorder refers to the presence of an obstruction in the meridian system and its collaterals, where the term Bi per se refers to an obstruction of the channels by an external pathogenic factor; however, nowadays, some external force such as trauma is also taken into account [17]. Recently, it has been commonly assumed that the Impediment disorder is an exclusive manifestation of stagnation and joint pain, and some practitioners refer to it alternatively as the "arthralgia syndrome" [18].

The term Bi is not a new, having been described since ancient times in the Huangdi Neijing Suwen (Chapter 43) [19] as an invasion by an external pathogen. However, it proposes a much more varied classification than the one that is currently employed by TCM practitioners. This classic treatises of medicine speak of multiple forms of Bi, which seem to have in common only the concept of obstruction in the channels and different structures of the human body. Its differentiation includes the classification of this syndrome from the kind of structure is invaded according to the season of the year (e.g., in spring, it is the tendons; in summer, it is the blood vessels) to the organ that will be attacked if the pathogen is not expelled and the case is solved (from the tendons it will penetrate to the Liver, from the blood vessels to the Heart).

More recently, different authors have classified Impediment disorder depending mainly on the pathogen involved and the clinical manifestations it generates [20]. As a general rule, it is assumed that Wind will generate a mobile Bi whose painful manifestations migrate from one side to another; Cold will produce spasms and fixed pain; Dampness produces a fixed pain with numbness; and some others recognize Heat as capable of producing palpable redness and inflammation [18], although this, in particular, is associated less with exogenous factors and more with the manifestation of endogenous causes in contexts such as autoimmune disease [21].

Originally, the Impediment disorder referred more to conditions of the internal organs [19]; however, nowadays, some authors recognize this disorder as part of their diagnoses for

conditions as varied as those associated with cardiology [22]. In modern times, it is assumed by default that when referring to this group of syndromes (regardless of their causative pathogenic factor), we are referring more to musculoskeletal disorders than to those of the internal organs.

Treatment guidelines are very varied, but it is generally assumed that acupuncture is a good treatment method because it is able to, in traditional terms, improve and accelerate the flow of Blood and Energy within the channels, to restore function and to eliminate pain. Previously, specific methods were described for the treatment of each type of Bi. However, specifically for Bi in muscles, which is responsible for myalgia and pain on palpation, the Systematic Classic of Acupuncture and Moxibustion recommends the deep puncture of the area with as many needles as possible, being very clear about not touching joints or bones, to produce (or "introduce", in more textual terms) heat in the area. In general, for any kind of Bi, it recommends a correct differentiation in terms of excess and deficiency patterns in the channels that are involved and the application of massage to improve the flow of Qi in the area [23].

More contemporary authors have suggested different treatment methods than the one mentioned above. For example, it is recommended to first puncture distal points in order to eliminate or reduce, to the extent possible, the pain that is present and to make local puncture tolerable in the area that is to be treated. Likewise, it is clarified that, in acute cases, the distal puncture is done first whereas, in chronic cases, this will only support the local points [15,16].

Li Ping recommends, while citing Nguyen Van Nghi, after identifying the affected channel (or channels), the puncture of the Well point, considering that this is where the SCs are "born" or originate, with the subsequent addition to the treatment of the tonifying Mother point, Ashi points, and the corresponding meeting point of the affected SCs [7]. Unique to this approach is the recognition of a probable psychological origin (emotional tension) as the trigger for pain and obstruction in the SCs; moreover, this approach mentions the meeting point as a preventive point against the spread of the pathogen from the affected channel to another healthy channel. In contrast to this use of meeting points, Giovanni Maciocia suggests their use as a treatment catalyst to improve the work on the affected canal [15].

Previously, it was considered that, if the causative agent of a Bi is not expelled (regardless of the affected tissue), it could penetrate and cause consequences or sequelae that vary in nature and severity. For example, if the pathogen remained in the bones, it would cause heaviness and paralysis; in the tendons, it would cause hypertonia, arthralgias, and inability to walk; whereas, in the muscles, it would cause chronic pain [23]. The Suwen goes even further by assuring that the patient will perish if the pathogen is not properly expelled, by reaching the internal organs [19]. In a more modern, but traditional approach, it is assumed that a Bi that becomes chronic will cause blood stasis in the affected area with chronic pain [18] or the accumulation of phlegm [20] which, following the classics, would cause malnutrition of the area to cause numbness or desensitization [23].

Acupuncture is an effective and simple technique to apply in the management of pain, but it is not the only therapeutic resource that TCM offers for the management of this group of ailments. There are more techniques that will be quickly addressed as adjuvants in the treatment and management of musculoskeletal and myofascial pain with both a traditional and physiological explanation.

CUPPING THERAPY

Although cupping therapy is not exclusive to nor originated in China, TCM is one of the medicines that most exploited this technique [24]. At present, cupping is probably, after acupuncture and herbal medicine, one of the most widely used techniques in TCM. It is utilized not only in the context of musculoskeletal diseases or symptoms, but also in systemic or organic conditions that can be resolved or alleviated by the application of this therapeutic agent. From its traditional use to eliminate Qi stagnation and regulate its natural flow [25] to the classic pain management where it has been found to have an effectiveness similar to that of conventional analgesics [26], to its intra-hospital application, for example, in the management of post-surgical complications [27], cupping has diverse applications that are so varied that its usefulness has even been proposed in the management of cardiac problems [28].

Nonetheless, beyond its countless applications, proven or otherwise, several mechanisms have been proposed as to how such an apparently simple and rudimentary therapy works. From a traditional perspective, its effect is basically summarized in the mobilization of Blood and Qi that are stagnant in the SC, for example, as well as the removal of external pathogenic factors that cause diseases [29]. In regard to this purpose, it is mentioned in the differentiation of syndromes by the four layers that when the pathogen is at the most superficial level (Qi level), the application of cupping will be the most effective means to expel it and thus prevent it from penetrating deeper, in order to restore health [30]. This is not surprising considering that some authors attribute to cupping an intense energy dispersion action [31], that is, while other methods such as moxibustion will have tonifying effects, cupping will have the opposite effect by favoring the drainage of excesses and the expulsion of external pathogens. Basically, the action of cupping in TCM can be summarized as the expulsion of pathogens, if any, and the mobilization

of Qi and Blood to eliminate their stagnation, with some authors claiming that nothing is more effective than cupping to achieve the latter purpose [30].

There is not only one type of suction cup or one procedure for the application of cupping. As the equipment is made of different materials, the application methods are also very varied. In general, we can divide cupping into dry and wet cupping. The former consists of the application of the suction cup without corrupting the integrity of the skin, and its application will differ in whether the cupping is left fixed, moved (mobile application), or is done intermittently (in burst) [22]. On the other hand, in wet cupping, some laceration to the skin will occur and cause bleeding [28,29].

However, several theories have been proposed to explain the physiological mechanism of action of cupping therapy. Its effects are well known: the promotion of blood flow to the skin and underlying musculature, modification of the biomechanical properties of the skin, lowering of the pain threshold, and improvement of local anaerobic metabolism, among others [32]. However, knowing the effects does not guarantee being able to explain the mechanisms by which these effects occur [33].

Different theories have been proposed through which cupping could modify, for example, the perception of pain and reduce its intensity, as in musculoskeletal conditions. One of these theories is based on the gate theory, which suggests that contra-irritation and antinociceptive regulation would be responsible for the closure of the gate and its analgesic action [34].

In very crude terms, the idea that one pain inhibits another pain has also been mentioned, that is, the theory of diffuse noxious inhibitory nociceptive control [35]. This approach has produced some results in the management of pain syndromes, although it was not directly evaluated by cupping [36]. Another theory is the reflex zone theory, wherein pain would spread from one dermatome to another [37]. Thus, visceral pain is reflected as musculoskeletal pain. Under this approach, it is theorized that stimulation of the reflex zone, in this case the skin, will cause the activation of cutaneous receptors that are effected through neurological and humoral pathways and will produce a correction in blood flow and improve the nutrition of the affected organ or tissue [38], which could be achieved by cupping [39].

Nitric oxide is another mechanism that has been proposed to explain the therapeutic effect of cupping. This gas is a potent vasodilator, which could partially explain the pronounced vasodilation produced by cupping. A higher concentration of this cellular mediator has been found around acupuncture points [40]. Furthermore, it is indispensable for proper wound healing [41]. It has been corroborated that blood extracted from areas where wet cupping was applied contains, among other substances, higher levels of nitric oxide, suggesting that the concentration is increased in these areas [42], which would imply that the technique has an effect in accelerating healing and would explain that the vasodilation generated is not only due to the negative pressure exerted by the vacuum that is applied on the skin.

Cupping has not only been proposed to have therapeutic effects at the muscular or organ level; it has even been proposed to be able to enhance the immune response. Among their multiple effects, it has been found to be able to increase the amounts of serum C3 protein and decrease IgE and IL-2 concentrations [43]. In addition, other pathways whereby the immune response would be enhanced have been proposed: irritation of the immune system by local production of inflammation, activation of the complement system, and increased plasma levels of interferon and tumor necrosis factor [24]. The local generation of auto-hemolysis that would lead different blood components to degrade to histamine-like substances that produce an improvement in the immune response has also been studied [44].

In comparison to the traditional idea that cupping is able to expel pathogens and detoxify the body [30], there is some evidence in favor of it. When analyzing wet cupping blood samples, much higher concentrations of metabolites, such as uric acid and triglycerides, have been identified compared to venous blood samples [45,46].

Cupping therapy can be applied to almost any part of the body, especially muscular regions. However, this will depend on the pathology that is to be treated; nevertheless, there are regions recognized to promote not only a local response, but a general improvement, for example, the intrascapular region [47]. Areas such as this, where anatomical and energetic structures converge (e.g., major meridians), exert a generalized regulatory effect.

In general, cupping therapy has a fairly high safety margin; however, it is not exempt from situations to be considered in order to maintain the safety profile. For example, it should never be applied directly on blood vessels (healthy or not) [32], on injured skin [24] and much less in cancer patients [30].

There are several theories that explain the aforementioned benefits of cupping therapy that it would be impossible to reconcile them all under a unifying theory that would explain all the effects as one [23]. The recommendation would then be to study them and take the best of each one to explain their different effects: muscle relaxation, acceleration of tissue healing, increase in connective tissue elasticity, lymphatic drainage, optimization of muscle contraction, etc. [24,29].

GUA SHA

This is a technique in various Asian medical practices that

consists of the exertion of constant friction by unidirectional scraping on the skin to intentionally create localized ecchymosis secondary to the extravasation of local capillaries [48]. Among its traditional functions are tendon relaxation, elimination of blockages and obstructions in channels and collaterals, elimination of internal heat, tonification of Wei Qi to eliminate pathogens, lowering of excessive Yang, among others [49,50]. Its modern applications range from aesthetic purposes to improve the state of the facial skin [51], through the treatment of all types of internal conditions, to the commonest, which is the management of pain [52]. Within this practice, the local generation of ecchymosis, a reddening of the skin associated with the extravasation of blood products in the subcutaneous tissue, is intentionally sought; this reddening is called Sha, whereas the word Gua refers to the scraping itself [48]. Although Sha has been compared to toxins that seek to be eliminated by extravasation for subsequent return to the bloodstream and elimination [49], other authors describe it simply as the manifestation of blood stasis in the channels and collaterals [53].

Several theories have been proposed to explain its function and physiological basis. As mentioned earlier, nitric oxide has also been mentioned as likely responsible for the vasodilator action of this manual therapy; however, a peculiarity was found regarding this manipulation modality. Repetitive therapies applied for the management of myofascial conditions have been found to produce a proinflammatory cytokine release cascade; however, it was found that if this is performed unidirectionally it apparently produces a paradoxical effect where anti-inflammatory cytokines are released by the constant and orderly perturbation of the cellular matrix [54]. Not only has a modulation of the humoral inflammatory response been found by finding decreased serum levels of mediators such as IL-1, but also in histological analysis after application of Gua Sha, a reduced proliferation of proinflammatory cells at the site of intervention [55]. This translates, for example, into an almost immediate decrease in pain even in chronic stages [56] and not only in musculoskeletal pain; however, its use has been evaluated in conditions as varied as breast engorgement in women during the puerperium [57].

Nonetheless, the beneficial effects of Gua Sha are not limited to its application in pain. It has also been shown to be effective in improving muscle recovery after intense training, even biochemically demonstrated with modifications in serum markers such as creatinine kinase (CK) or blood urea nitrogen (BUN) [58]. It has also been shown to be useful in the multidisciplinary management of chronic fatigue syndrome [59] or high blood pressure [60].

At the superficial level, the marked ability of this technique to produce a marked increase in blood microcirculation and local metabolism has been demonstrated on multiple occasions [61] and has been estimated to be up to 4 times higher than the pre-treatment perfusion index [62]. These effects go beyond just the circulatory system, but the ability of Gua Sha to produce an effect on the nervous system such as a regulation between sympathetic and parasympathetic nervous system activities has also been studied [63]. Even more astonishing is that the effects of this traditional technique go far beyond its potential for the treatment of external pathologies, being able to be an adjuvant in the management of chronic pathologies that are difficult to treat, such as chronic hepatitis. Cases have been reported where there is a marked decrease in liver enzyme activity, translated into at least partial remission of inflammatory activity in the hepatic parenchyma [64]. It is believed that effects such as this could derive from its capacity to activate the expression of genes responsible for the production and antioxidant enzymes such as heme oxygenase-1; it has been found to be elevated even in apparently healthy patients who undergo this treatment [65], which could confer not only analgesic effects, but also antioxidant and even hepatoprotective effects.

The mechanisms whereby Gua Sha exerts its analgesic and muscle relaxant effects cannot be explained by a single theory. There are so many local and even systemic mechanisms that most likely participate in synergy to carry out all the properties described here and many more. Finally, it is considered as a safe therapy. However, certain precautions should be taken, such as not using Gua Sha on very debilitated patients, patients with coagulation problems, in treatment with anticoagulants, or on wounded skin [48,50].

CONCLUSIONS

As it has been briefly developed, the comparison between these two systems reveals a close similarity in different planes, such as the anatomical and functional. Furthermore, we propose that the approach in the treatment of their pathologies is broadened by considering different approaches, not only the physiotherapeutic treatment will be effective as well as not only the treatment with TCM techniques will bear fruit. Making this type of comparison and complementary evaluation between approaches allows us as clinicians to broaden our perspective of diagnosis and treatment to offer more options to patients who daily seek care and relief from musculoskeletal discomfort, which is increasingly frequent in a world that demands more from us not only physically but even mentally.

We believe that it is prudent and necessary to carry out more studies to further elucidate the mechanisms by which the ancient techniques of TCM exert their effects from a physiological perspective in terms that are easy to understand for the scientific community in general. Not for nothing

far from decreasing in popularity and frequency, its use is increasingly widespread among diverse audiences: from high performance athletes to people who do not exercise such a demanding physical activity.

Continuing this type of work that demonstrates that the tools of TCM are not obsolete, but valid, safe and above all effective, in no way detracts from the traditional and philosophical background that ultimately gave rise to this medicine. On the contrary, it validates and modernizes this noble practice in a world that increasingly seeks a scientific explanation. In a scientific community where terms like "wind", "stagnation" or "cold" are viewed with suspicion, they must be translated into terms of molecules, nerve pathways and neurotransmitters. That is our job as clinicians and researchers.

FUNDING

The authors self-financed this project, and no scholarship or external funding was availed for this research.

AUTHORS' CONTRIBUTIONS

Conceptualization, investigation, writing – review & editing: Pablo Nava Jaimes. Investigation, writing – review & editing: Alejandro Martínez Reyes. Supervision, validation: Daniel García Lara. Supervision, validation: Abel Cristian Patiño Coyuca.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ORCID

Pablo Nava Jaimes, https://orcid.org/0000-0002-0989-7104
Alejandro Martínez Reyes, https://orcid.org/0000-0002-7601-5642
Daniel García Lara, https://orcid.org/0000-0003-4629-2275
Abel Cristian Patiño Coyuca, https://orcid.org/0000-0002-7549-3044

REFERENCES

1. Quiles L, Peluffo E. Tendino-Muscular Meridians (*Jīng Jīn*) and fascial tissue, anatomical and functional comparison. Rev Int Acupunt 2016;10:20-4. https://doi.org/10.1016/j.acu.2016.01.002
2. Pinzon Rios ID. [Fascial system: anatomy, biomechanics and its importance in physical therapy]. Mov Cient 2018;12:1-12. Spanish. https://doi.org/10.33881/2011-7191.mct.12201
3. Pilat A. [Myofascial Therapies]. Madrid: McGraw-Hill Interamericana, 2011. Spanish.
4. Bordoni B, Myers T. A review of the theoretical fascial models: biotensegrity, fascintegrity, and myofascial chains. Cureus 2020; 12:e7092. https://doi.org/10.7759/cureus.7092
5. Bianco G. Fascial neuromodulation: an emerging concept linking acupuncture, fasciology, osteopathy and neuroscience. Eur J Transl Myol 2019;29:8331. https://doi.org/10.4081/ejtm.2019.8331
6. Myers TW. [Anatomic Pathways], 3rd ed. Barcelona: Elservier, 2015. Spanish.
7. Ping L. [The Great Book of Chinese Medicine]. Barcelona: Booket, 2013. Spanish.
8. Estévez Rivera EA. [Myofascial pain]. MedUNAB 2001;4:203-7. Spanish.
9. Dorsher P. Meridianos miofasciales como evidencia anatómica de los canales de acupuntura. Acupunt Médica 2009;21:91-7. Spanish.
10. Iturriaga V, Bornhardt T, Oporto G. [Myofascial pain in the craneocervical territory: a review of the pathology and its relationship with the GABAergic system genetic polymorphisms]. Av Odontoestomatol 2015;31:267-71. Spanish. https://doi.org/10.4321/S0213-12852015000400004
11. Villaseñor-Moreno JC, EscobarReyes VH, De la Lanza-Andrade LP, Guizar-Ramírez BI. Síndrome de dolor miofascial. Epidemiology, physiopathology, diagnosis and treatment. Rev Espec Méd Quir 2013;18:148-57. Spanish.
12. Chavarría SJ. [Myofascial pain syndrome, diagnosis and treatment]. Rev Med Costa Rica Centroam 2014;71:683-9. Spanish.
13. Velasco M. [Musculoskeletal pain: fibromyalgia and myofacial pain syndrome]. Rev Méd Clín Las Condes 2019;30:414-27. Spanish. https://doi.org/10.1016/j.rmclc.2019.10.002
14. Golhar SJ. Correlation between myofascial pain dysfunction syndrome and cervical pain: a review. Mod Res Dent 2020;4: 433-4. https://doi.org/10.31031/MRD.2020.04.000599
15. Maciocia G. The Channels of Acupuncture: Clinical Use of the Secondary Channels and Eight Extraordinary Vessels. Edinburgh: Churchill Livingstone, 2006.
16. He Q, Scott P, Zhang Y. TCM Case Studies: External Medicine. Beijing: People's Medical Publishing House, 2014.
17. Maciocia G. The Practice of Chinese Medicine: The Treatment of Diseases with Acupuncture and Chinese Herbs, 2nd ed. Edinburgh: Churchill Livingstone, 2008.
18. Zhang EQ. *Bi* syndrome (arthralgia syndrome). J Tradit Chin Med 2010;30:145-52. https://doi.org/10.1016/s0254-6272(10)60032-5
19. Ni M. The Yellow Emperor's Classic of Medicine: A New Translation of the Neijing Suwen with Commentary. Boston: Shambhala, 1995.
20. Hurtado Lozano DL, Ángel Macías MA. Acupuncture in the management of osteoarthritis. Rev Int Acupunt 2012;6:64-9. https://doi.org/10.1016/S1887-8369(12)70055-8

21. Hou W, Xu G, Wang H, Gould J. Treating Autoimmune Disease with Chinese Medicine. Edinburgh: Churchill Livingstone, 2011.
22. Hu J. Acupuncture treatment of chest *Bi* syndrome. J Tradit Chin Med 2008;28:148-51. https://doi.org/10.1016/s0254-6272(08)60034-5
23. Huangfu M. The Systematic Classic of Acupuncture & Moxibustion. Boulder: Blue Poppy Press, 2004.
24. Chirali IZ. Cupping Therapy for Bodyworkers: A Practical Manual. London: Singing Dragon, 2018.
25. Wu F, Hu LX. Clinical application of quick cupping onto shenque (CV 8). J Tradit Chin Med 2009;29:275-6. https://doi.org/10.1016/s0254-6272(09)60081-9
26. Zhang SJ, Liu JP, He KQ. Treatment of acute gouty arthritis by blood-letting cupping plus herbal medicine. J Tradit Chin Med 2010;30:18-20. https://doi.org/10.1016/s0254-6272(10)60005-2
27. Farhadi K, Choubsaz M, Setayeshi K, Kameli M, Bazargan-Hejazi S, Zadie ZH, et al. The effectiveness of dry-cupping in preventing post-operative nausea and vomiting by P6 acupoint stimulation: a randomized controlled trial. Medicine (Baltimore) 2016;95:e4770. https://doi.org/10.1097/MD.0000000000004770
28. Arslan M, Yeşilçam N, Aydin D, Yüksel R, Dane S. Wet cupping therapy restores sympathovagal imbalances in cardiac rhythm. J Altern Complement Med 2014;20:318-21. https://doi.org/10.1089/acm.2013.0291
29. Choi K. Cupping Therapy for Muscles and Joints: An Easy-to-Understand Guide for Relieving Pain, Reducing Inflammation and Healing Injury. Berkeley: Ulysses Press, 2018.
30. Chirali IZ. Traditional Chinese Medicine Cupping Therapy, 3rd ed. Edinburgh: Church Livingstone, 2014.
31. Zhong L. Joint reinforcing-reducing effect of acupuncture, moxibustion and cupping therapies. J Tradit Chin Med 2009;29:101-3. https://doi.org/10.1016/s0254-6272(09)60042-x
32. Aboushanab TS, AlSanad S. Cupping therapy: an overview from a modern medicine perspective. J Acupunct Meridian Stud 2018;11:83-7. https://doi.org/10.1016/j.jams.2018.02.001
33. Al-Bedah AMN, Elsubai IS, Qureshi NA, Aboushanab TS, Ali GIM, El-Olemy AT, et al. The medical perspective of cupping therapy: effects and mechanisms of action. J Tradit Complement Med 2018;9:90-7. https://doi.org/10.1016/j.jtcme.2018.03.003
34. Ahmadi A, Schwebel DC, Rezaei M. The efficacy of wet-cupping in the treatment of tension and migraine headache. Am J Chin Med 2008;36:37-44. https://doi.org/10.1142/S0192415X08005564
35. van Wijk G, Veldhuijzen DS. Perspective on diffuse noxious inhibitory controls as a model of endogenous pain modulation in clinical pain syndromes. J Pain 2010;11:408-19. https://doi.org/10.1016/j.jpain.2009.10.009
36. Bernaba M, Johnson KA, Kong JT, Mackey S. Conditioned pain modulation is minimally influenced by cognitive evaluation or imagery of the conditioning stimulus. J Pain Res 2014;7:689-97. https://doi.org/10.2147/JPR.S65607
37. Marquardt H. Reflexotherapy of the Feet, 2nd ed. Stuttgart: Thieme, 2016.
38. Sato A, Sato Y, Schmidt RF. The impact of somatosensory input on autonomic functions. Rev Physiol Biochem Pharmacol 1997;130:1-328.
39. Shaban T. Cupping Therapy Encyclopedia. [North Charleston]: Createspace Independent Publishing Platform, 2018.
40. Ma SX. Enhanced nitric oxide concentrations and expression of nitric oxide synthase in acupuncture points/meridians. J Altern Complement Med 2003;9:207-15. https://doi.org/10.1089/10755530360623329
41. Schaffer MR, Tantry U, Gross SS, Wasserburg HL, Barbul A. Nitric oxide regulates wound healing. J Surg Res 1996;63:237-40. https://doi.org/10.1006/jsre.1996.0254
42. Tagil SM, Celik HT, Ciftci S, Kazanci FH, Arslan M, Erdamar N, et al. Wet-cupping removes oxidants and decreases oxidative stress. Complement Ther Med 2014;22:1032-6. https://doi.org/10.1016/j.ctim.2014.10.008
43. El-Domyati M, Saleh F, Barakat M, Mohamed N. Evaluation of cupping therapy in some dermatoses. Egypt Dermatol Online J 2013;9:2.
44. Chen LH, Li XB. Clinical application of cupping therapy. Jilin Zhongyiyao 2004;24:60-1. https://doi.org/10.13463/j.cnki.jlzyy.2004.08.053
45. Danyali F, VaezMahdavi MR, Ghazanfari T, Naseri M. [Comparison of the biochemical, hematological and immunological factors of "cupping" blood with normal venous blood]. Physiol Pharmacol 2009;13:78-87. Persian.
46. Kim JI, Lee MS, Lee DH, Boddy K, Ernst E. Cupping for treating pain: a systematic review. Evid Based Complement Alternat Med 2011;2011:467014. https://doi.org/10.1093/ecam/nep035
47. Niasari M, Kosari F, Ahmadi A. The effect of wet cupping on serum lipid concentrations of clinically healthy young men: a randomized controlled trial. J Altern Complement Med 2007;13:79-82. https://doi.org/10.1089/acm.2006.4226
48. Ghods R, Sayfouri N, Ayati MH. Anatomical features of the interscapular area where wet cupping therapy is done and its possible relation to acupuncture meridians. J Acupunct Meridian Stud 2016;9:290-6. https://doi.org/10.1016/j.jams.2016.06.004
49. Nielsen A. Gua Sha: A Traditional Technique for Modern Practice, 2nd ed. Edinburgh: Churchill Livingstone, 2012.
50. Zhongchao W. Gua Sha Scraping Massage Techniques: A Natural Way of Prevention and Treatment through Traditional Chinese Medicine. Shanghai: Shanghai Press, 2018.
51. Pritchard S. Tui na: A Manual of Chinese Massage Therapy. Edinburgh: Church Livingstone, 2010.
52. Witham C. Facial Gua Sha: A Step by Step Guide to a Natural Facelift. Poole: Mangrove Press, 2018.
53. Gold R. Seitai (Lymphatic) Shiatsu: Cupping and Gua Sha for a

Healthy Immune System. London: Singing Dragon, 2019.
54. Standley PR, Meltzer K. In vitro modeling of repetitive motion strain and manual medicine treatments: potential roles for pro- and anti-inflammatory cytokines. J Bodyw Mov Ther 2008;12:201-3. https://doi.org/10.1016/j.jbmt.2008.05.006
55. Jiang R, Xu G, Chen H, Li J, Yang T, Guo Y. Effect of scraping therapy on interleukin-1 in serum of rats with lumbar disc herniation. J Tradit Chin Med 2013;33:109-13. https://doi.org/10.1016/s0254-6272(13)60110-7
56. Wang XQ, Duan PB, Zheng M, Yang LH, Wang AQ, Zhang M. Effect of scraping therapy on chronic low back pain: a systematic review and meta-analysis of randomized controlled trials. J Manipulative Physiol Ther 2021;44:255-70. https://doi.org/10.1016/j.jmpt.2020.08.003
57. Chiu JY, Gau ML, Kuo SY, Chang YH, Kuo SC, Tu HC. Effects of Gua-Sha therapy on breast engorgement: a randomized controlled trial. J Nurs Res 2010;18:1-10. https://doi.org/10.1097/JNR.0b013e3181ce4f8e
58. Wang X, Jia B, Zhong H, Huang X, Chen R, Yang J. Effects of Gua Sha therapy on weightlifting training: a randomized trial. J Tradit Chin Med 2019;39:575-81. https://doi.org/10.19852/j.cnki.jtcm.2019.04.016
59. Lei LM, Wu QY, He YF. [Scraping on head and face combined with stepping technique of *tuina* along lower limbs for chronic fatigue syndrome]. Zhongguo Zhen Jiu 2020;40:1057-60. Chinese. https://doi.org/10.13703/j.0255-2930.20190801-k0006
60. Ji R, Sun T, Sun J, Yang J, Shi Y. [Guasha combined with bleeding therapy for mild hypertension]. Zhongguo Zhen Jiu 2015;35:275-8. Chinese. https://doi.org/10.13703/j.0255-2930.2015.03.023
61. Xu QY, Yang JS, Zhu B, Yang L, Wang YY, Gao XY. The effects of scraping therapy on local temperature and blood perfusion volume in healthy subjects. Evid Based Complement Alternat Med 2012;2012:490292. https://doi.org/10.1155/2012/490292
62. Nielsen A, Knoblauch NT, Dobos GJ, Michalsen A, Kaptchuk TJ. The effect of Gua Sha treatment on the microcirculation of surface tissue: a pilot study in healthy subjects. Explore (NY) 2007;3:456-66. https://doi.org/10.1016/j.explore.2007.06.001
63. Wang X, Chatchawan U, Nakmareong S, Silsirivanit A, Wang Y, Xie D, et al. Effects of GUASHA on heart rate variability in healthy male volunteers under normal condition and weightlifters after weightlifting training sessions. Evid Based Complement Alternat Med 2015;2015:268471. https://doi.org/10.1155/2015/268471
64. Chan ST, Yuen JW, Gohel MD, Chung CP, Wong HC, Kwong KK. Guasha-induced hepatoprotection in chronic active hepatitis B: a case study. Clin Chim Acta 2011;412:1686-8. https://doi.org/10.1016/j.cca.2011.05.009
65. Kwong KK, Kloetzer L, Wong KK, Ren JQ, Kuo B, Jiang Y, et al. Bioluminescence imaging of heme oxygenase-1 upregulation in the Gua Sha procedure. J Vis Exp 2009;(30):1385. https://doi.org/10.3791/1385