International Journal of Public Health Science (IJPHS)
Vol. 14, No. 2, June 2025, pp. 672~681
ISSN: 2252-8806, DOI: 10.11591/ijphs.v14i2.25168

The therapeutic potential of Gua Sha on fascia: evidence and possible mechanisms

Beibei Wang[1], Hongxiu Chen[1], Wichai Eungpinichpong[2,3]
[1]Department of Exercise and Sport Sciences, Faculty of Graduate School, Khon Kaen University, Khon Kaen, Thailand
[2]School of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University, Khon Kaen, Thailand
[3]The Research Center in Back, Neck, Other Joint Pain and Human Performance (BNOJPH), Division of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University, Khon Kaen, Thailand

Article Info

Article history:

Received May 17, 2024
Revised Oct 15, 2024
Accepted Jan 7, 2025

Keywords:

Evidence
Fascia
Gua Sha
Inflammation
Mechanism
Pain
Scraping

ABSTRACT

In recent years, the effects of Gua Sha on fascia have gradually attracted attention. This review evaluates the effects of Gua Sha on fascia and its underlying mechanisms. We searched major academic databases for relevant studies using the keywords "Gua Sha or scraping," "fascia or pain or inflammation," and "randomized controlled trial (RCT)." Only RCTs published in English were included. Two independent reviewers screened and assessed the methodological quality of the studies using the PEDro scoring scale. After applying the inclusion criteria, nine studies involving 436 participants were included in the final analysis. The methodological quality of the included studies varied, with PEDro scores ranging from 6 to 9. Research results suggest that Gua Sha may help relieve pain, reduce fascial inflammation, and increase flexibility. Potential mechanisms include improved blood and lymph circulation, neuromodulation, and mechanical stimulation. These results highlight the potential of Gua Sha as an alternative treatment for fascia-related problems. Further studies are needed to consolidate these findings and elucidate the underlying mechanisms.

Corresponding Author:

Wichai Eungpinichpong
School of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University
Khon Kaen University 123, Mitraphab Highway, Muang, Khon Kaen 40002, Thailand
Email: wiceun@kku.ac.th

1. INTRODUCTION

Fascia, a dense connective tissue network enveloping muscles, bones, and organs, plays a crucial role in structural integrity, movement, and proprioception [1]. Recent advancements have deepened our understanding of fascia, with new evidence [2] suggesting fascial dysfunction can contribute to musculoskeletal diseases like chronic pain, stiffness, and limited range of motion. Musculoskeletal disorders rank among the leading causes of disability and mortality on a global scale. Fascial dysfunction stands as a significant risk factor for these disorders. Ultrasound imaging studies have revealed that individuals suffering from conditions such as plantar fasciitis [3], chronic neck pain [4], and low back pain [5], [6] often exhibit thickening, stiffness, and reduced elasticity of the fascia. These alterations can result in restricted muscle movement, nerve compression, pain, and other related issues [6], [7].

Gua Sha is a traditional Chinese medicine technique that uses special Gua Sha tools to scrape the skin to stimulate acupuncture points and meridians to dredge qi and blood, relieve pain, activate blood circulation, and remove blood stasis [8]. In recent years, Gua Sha therapy has become increasingly commonly used in treating various painful diseases due to its remarkable efficacy and few side effects. Existing clinical research shows [9]–[12] that Gua Sha therapy significantly treats chronic neck, shoulder, lower back, and

plantar fasciitis pain. For example, one randomized controlled trial found that Gua Sha was more effective than a hot pack in treating neck pain [13]. Another study found that Gua Sha treatment for chronic low back pain can effectively relieve pain, improve range of motion, and improve patients' quality of life [14].

Despite Gua Sha's long history and widespread use in treating musculoskeletal diseases, its mechanism of action remains unclear. A systematic review and analysis of current research are urgently needed to establish a stronger scientific foundation for its clinical application. This study aimed to comprehensively evaluate the existing literature on the impact of Gua Sha on fascia. We will summarize the evidence supporting its use, explore potential mechanisms of action, and propose future research directions.

2. METHOD

2.1. Search strategy and selection criteria

To assess the effectiveness and safety of Gua Sha on fascia, we conducted a systematic review following established guidelines. Two researchers independently screened studies across various databases, including Scopus, Web of Science, PubMed, and Cochrane Library, to identify relevant studies published between 2000 and June 2024. A comprehensive search strategy was employed using keywords related to "Gua Sha or Scraping," "fascia or musculoskeletal pain or inflammation," and "randomized controlled trial." The search language was restricted to English.

2.2. Study selection

Inclusion criteria in this study are: these experiments must be randomized controlled trial (RCT); the subjects must be human; one of the intervention methods must be Gua Sha; and the measurement results must be related to indicators that may cause fascial changes, such as neuromodulation or blood circulation, or inflammation, or pain perception or sports performance-related results. Exclusion criteria in this study are: animal experiments, case studies, review articles and conference abstracts were excluded; studies with only abstracts or no full text; studies with a flawed methodology or questionable data integrity. Initially, two researchers independently conducted a preliminary screening based on titles and abstracts. Subsequently, full-text reviews of potential articles were performed for final selection. Any disagreements were resolved through discussion until a consensus was reached. However, if consensus could not be reached after discussion, a third reviewer was consulted to decide on the methodological quality of the included trials.

2.3. Data extraction

A standardized data extraction form was developed, and two authors independently reviewed each included study and extracted detailed information. The following aspects are: study design (must be an RCT first author name, publication year; number, age, and characteristics of participants; intervention method, duration, and frequency; outcome measures related to potential fascial changes; study conclusions. Two independent reviewers extracted data from each included study using a standardized form, then compared the extracted data and resolved any discrepancies through discussion.

2.4. Data quality assessment

Relevant data was extracted from the included studies according to a pre-defined format. The methodological quality of the included RCT was evaluated using the PEDro scoring scale. This scale is known for its high reliability (ICC=0.8) and validity (CBN risk of bias tool =0.83), as reported by Yamato *et al*. [15]. The PEDro scale consists of 11 items, each scored as 0 (absent) or 1 (present), with a maximum total score of 10. These items evaluate vital aspects of RCT design and conduct, including random allocation of participants, concealment of allocation from participants and researchers, baseline comparability of groups, blinding of participants and outcome assessors, completion of all assigned treatments, analysis of dropouts, inclusion of at least one relevant outcome measure; reporting of appropriate statistical methods; Presentation of point estimates and confidence intervals; clinical relevance of findings. Generally, higher scores indicate better methodological quality. Following the established criteria by Maher *et al*. [16] studies were categorized as high quality (score: 9-10), moderate quality (score: 6-8), and low quality (score: 5 or below).

3. RESULTS

3.1. Literature search results

For this study, a total of 94 relevant articles were retrieved. After removing duplicate articles, 40 articles remained. Abstracts and titles were further screened; six animal experiments, 14 systematic reviews, and five case reports were excluded, leaving 15 articles. The full text was then reviewed; three conference abstracts, two non-randomized controlled trials, and one prospective study were excluded, and nine articles were included. Data extraction and further analysis of the included articles showed that all articles met the data quality assessment and analysis standards, as shown in Figure 1.

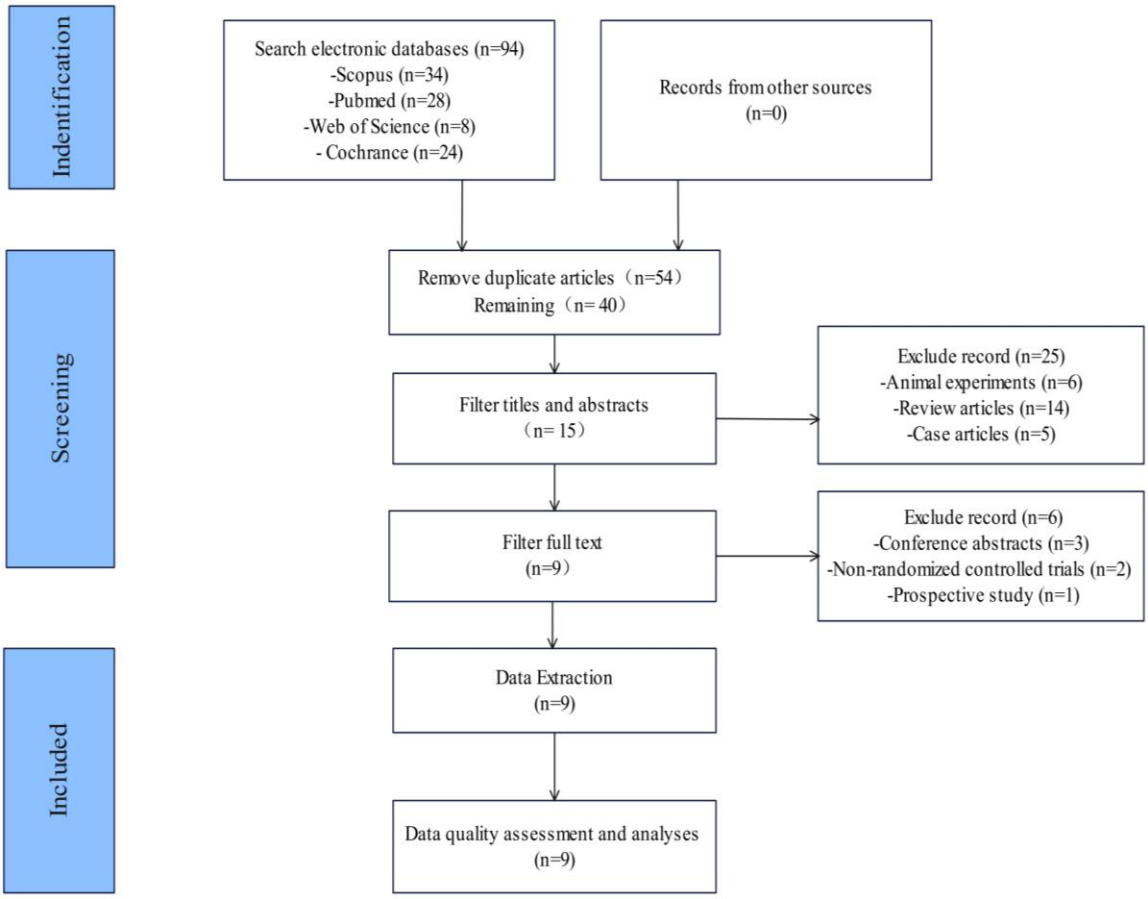

Figure 1. Literature screening flow chart

3.2. Quality assessment of included RCTs

This study used the PEDro scale to evaluate the quality of the nine included RCTs. The PEDro scores of all included RCTs were ≥6 points (out of 10 points), of which three were of high quality (scored 9 points), and the remaining six were of medium quality (2 scored 8 points, 3 scored 7 points, and 1 scored 6 points). Detailed quality assessment results are shown in Table 1.

Table 1 PEDro scores of the selected articles

Project	References								
	[13]	[10]	[17]	[18]	[14]	[19]	[12]	[11]	[20]
Randomly assigned	1	1	1	1	1	1	1	1	1
Conceal allocation	1	0	1	1	1	0	0	0	1
Baseline comparability	1	1	1	1	1	1	1	1	1
Blind treatment	0	0	0	0	0	0	0	0	0
Blinded outcome assessment	1	0	1	1	0	0	0	0	0
All treatments completed	0	1	0	1	0	1	1	0	0
Exiter analysis	1	0	1	1	1	0	0	1	1
At least one relevant outcome measure	1	1	1	1	1	1	1	1	1
Report sufficient statistics	1	1	1	1	1	1	1	1	1
Point estimates and confidence intervals	1	1	1	0	1	1	0	1	1
Clinical relevance	1	1	1	1	1	1	1	1	1
Total score	9	7	9	9	8	7	6	7	8

Regarding research design, nine studies adopted random allocation, five adopted hidden allocation, and three adopted blind outcome measurement. All studies recorded the number of people who completed the trial, four of which had no dropouts, and six studies conducted dropout analysis—seven studies conducted point estimates and confidence interval analysis on the data. Due to the particular nature of Gua Sha therapy,

no studies have adopted blind treatment. However, all studies conducted baseline assessments, including at least one relevant outcome measurement, and reported sufficient statistical data and clinical experimental analysis instructions. Therefore, the overall quality of the included articles is high, and the results have good clinical significance and value.

3.3. The effects of Gua Sha on the fascia

This study comprehensively reviewed nine RCTs to evaluate the effects of Gua Sha on various diseases. The results confirmed that Gua Sha may have specific therapeutic effects. As shown in Table 2, all included literature was published in English, with a sample size of 24 to 80 cases, an average age of 28 to 67.7 years, and the number of Gua Sha interventions ranging from 1 to 12 times, with 436 participants. The results of the review and analysis of the included literature showed that Gua Sha therapy may have specific preliminary effects on various disease-related problems, including:

Table 2. Evidence of Gua Sha therapy effectiveness

References	Subjects	Methods of intervention	Index of measurement	Conclusion
[19]	-Postpartum breastfeeding women: n=54 -GS G: n=27 -C G: n=27 -Mena age: 28	-GS G: Gua Sha -C G: hot compress and massage -Intervention time: 20±2 minutes, one intervention	-Breast circumference -Breast firmness -Pain score -Milk volume	Gua-Sha treatments can reduce breast swelling, hardness, and pain and increase milk supply.
[12]	-Plantar fasciitis: n=36 -GS G: n=12 -Cryostretch G: n=12 -Postural release techniques (PRT) G: n=12 -Mean age: 35.50±6.68	-GSG: Gua Sha and exercises. One time -Cryostretch G: Cryostretch techniques and exercises three times -PRT G: PRT and exercises seven times	-Pain intensity -Pain pressure threshold -Foot function index -Manometer	Gua Sha is superior at reducing pain, cryostretching improves foot function, and postural release techniques minimize tenderness.
[17]	-Patients with diabetic peripheral neuropathy: n=60 -GS G: n=30 -C G: n=30 -Mean age:58.86±11.75	-GS G: Gua Sha -C G: No intervention -30 minutes/session three times/week for eight weeks	-Pain value -Tactile Threshold -Heat Pain Threshold -Temperature Perception Testing -Nerve Conduction Velocity	Gua Sha therapy has significant therapeutic effects on patients with diabetic peripheral neuropathy and can relieve pain symptoms, improve nerve function, and enhance quality of life.
[18]	-Suffering from perimenopausal syndrome: n=80 -GS G: n=40 -C G: n=40 -Mean age: 49.2	-GS G: Gua Sha -C G: No intervention -15 minutes once a week for eight weeks	-Perimenopausal symptom score -Quality of life score -Serum estradiol level	Gua Sha therapy is efficacious in improving the symptoms of perimenopausal syndrome and improving the quality of life.
[20]	-Parkinson's disease patients with pain; n=56 -GS G: n=28 -C G: n=28 -Mean age: 66.9	-GS G: Gua Sha -C G: Not intervention -40 minutes /time, once a week, for 12 weeks	-Pain score -Parkinson's Disease Dysfunction Rating Scale -Tendon reflex time -Muscle tone	Gua Sha therapy can effectively relieve pain and improve quality of life and motor function in patients with Parkinson's disease.
[13]	-Chronic mechanical neck pain: n=48 -GS G: n=24 -C G: n=24 -Mean age: 58.5±8.0	-GS G: Gua Sha -C G: Hot pack -30 minutes /time, only once	Pain score Neck dysfunction Neck range of motion Pressure tenderness Quality of life	Gua Sha treatment significantly reduced pain and improved neck function in patients with chronic neck pain compared with the control group.
[14]	Chronic low back pain patients: n=50 -GS G: n=25 -C G: n=25 -Mean age: 49.0±1.0	-GS G: Gua Sha -C G: No treatment -15-20 minutes each time, two times in total	-Pain intensity -Oswestry Disability Index -Pain on movement - Pressure pain threshold	Gua Sha treatment significantly reduced pain, improved function, and enhanced quality of life in patients with chronic low back pain compared with a control group.
[10]	Chronic low back pain patients: n=12 -GS G: n=12 -C G: n=12 -Mean age: 67.7±7.3	-GS G: Gua Sha -C G: Hot pack -15 minutes/time every experiment -Crossover experiment, 28 days interval	-Tumor necrosis factor-alpha -Heme-oxygenase-1 levels -Pain intensity - Physical disability -Depression	Gua sha may have longer-lasting anti-inflammatory effects than heat, relieving pain and improving mobility.
[11]	Patients with neck or low back pain: n=40 -GS G: n=20 -C G: n=20 -Mean age: 49.23±10.96	-GS G: Gua Sha -C G: No treatment -30 minutes/time, only once	-Pain intensity -Pressure pain threshold -Neck and lower back function -Quality of life	Gua Sha treatment can significantly reduce pain intensity and improve pressure pain threshold in patients with neck and lower back pain.

3.3.1. Relief pain

Multiple studies support that Gua Sha therapy can relieve different types of pain, such as postpartum breast swelling [19], plantar fasciitis [12], diabetic peripheral neuropathy [17], chronic neck pain [11], [13], chronic low back pain [10], [11], [14], and Parkinson's disease pain [20]. These research results show that Gua Sha can relieve pain by promoting local blood circulation, relieving anesthesia, regulating the nervous system and other mechanisms. In addition, Gua Sha, as a non-drug treatment method, is highly safe and has few side effects, providing a new treatment option for pain patients.

3.3.2. Reduce inflammation

Gua Sha therapy may exert anti-inflammatory effects through several mechanisms. By enhancing blood circulation, facilitating lymphatic drainage, and potentially modulating the immune response, it may contribute to a reduction in inflammation. This is supported by evidence demonstrating its efficacy in alleviating pain in conditions such as plantar fasciitis [12] and diabetic peripheral neuropathy [17]. Furthermore, studies have shown that Gua Sha therapy can decrease inflammation-related markers in patients with chronic low back pain [10]. These findings suggest that Gua Sha therapy may have a beneficial role in managing inflammatory conditions.

3.3.3. Improve muscle and joint flexibility

Gua Sha therapy has been proposed as a means to enhance muscle and joint flexibility. By purportedly disrupting fascial adhesions and increasing fascial elasticity, it may facilitate improved range of motion. Supporting this notion, studies have demonstrated that Gua Sha therapy, beyond its pain-relieving effects, can positively influence the function of associated regions. For instance, improvements have been observed in foot function among individuals with plantar fasciitis [12], motor function in Parkinson's disease [20], and neck or low back function in patients with chronic neck and low back pain [10], [11], [13], [14]. These findings suggest a potential role for Gua Sha therapy in addressing functional limitations associated with musculoskeletal conditions.

3.4. Potential mechanisms of Gua Sha on the fascia

The benefits of Gua Sha therapy, especially pain relief and improved function, may be attributed to its effects on the fascial system. The scraping action of Gua Sha is thought to induce multiple physiological changes that promote healing and improve fascial health. Although there are currently no studies that directly explore the effect of Gua Sha on fascia, the following mechanisms may exist. One potential mechanism involves improved blood circulation. The friction generated by Gua Sha may increase blood flow to the treated area [21], providing essential nutrients and oxygen to the fascia tissue, promoting tissue repair, and potentially reducing pain. On the other hand, Gua Sha may stimulate lymphatic drainage and promote the removal of waste and inflammatory mediators from the fascia, further reducing inflammation and accelerating healing [10], [12]. In addition, the mechanical stimulation of Gua Sha may activate sensory nerve endings, triggering mechanisms that inhibit the transmission of pain signals [13]. Finally, the pressure applied during scraping may help loosen fascial adhesions, improve fascial gliding function, and potentially increase joint mobility [10]. It is important to note that these mechanisms are still being explored, and further research is needed to understand how Gua Sha interacts with fascia thoroughly and comprehensively understand how Gua Sha interacts with fascia. However, the results of this review suggest a reasonable connection between Gua Sha therapy and improvements in fascia-related disorders.

4. DISCUSSION

This systematic review identified nine high-quality RCTs investigating the effects of Gua Sha therapy on fascia and various health conditions. In this discussion, we will explore the main findings, delve into potential mechanisms by which Gua Sha may affect fascia, critically examine the limitations of the current evidence, and outline promising directions for future research.

4.1. Evidence of the effect of Gua Sha on the fascia

Gua Sha appears to exert therapeutic effects through various mechanisms, including pain reduction, inflammation mitigation, and improved flexibility. Human studies support its effectiveness in treating pain and chronic conditions. In contrast, animal studies suggest Gua Sha may enhance fascial blood flow and strengthen its gliding ability, potentially reducing fascial inflammation and pain [22], [23]. The followings display a closer look at the evidence:

4.1.1. Gua Sha can relieve pain

Gua Sha functions as a myofascial release technique, employing a Gua Sha tool to scrape the skin and induce petechiae called "Sha." Researchers apply the tool along meridians in a single direction, pressing with sufficient force (1-1.25 kg) to reach the fascia layer [24]. Several studies have shown that Gua Sha is

effective in controlling pain. For example, Gua Sha can reduce the intensity of lower back and chronic neck pain compared to a control group [10], [11], [13]. It is worth noting that similar physical therapy approaches, such as other fascial release techniques, have also been shown to have pain-relieving effects on various conditions, including myofascial pain, trigger point sensitivity, and chronic low back pain [25]–[28]. These findings suggest that Gua Sha may share some common analgesic mechanisms with other myofascial release techniques, providing evidence of its potential to relieve pain.

4.1.2. Gua Sha can reduce inflammation

Gua Sha may exert its anti-inflammatory effects through various mechanisms, including the potential for improved blood flow to the fascia. Enhanced blood flow can deliver essential nutrients and oxygen, promote healing, and reduce inflammation. Many studies support this idea, showing reduced pain and improved range of motion in the neck, shoulders, neck, shoulders, and back myofascial area after Gua Sha treatment [29]. Animal studies provide further insights. Research has shown that Gua Sha can reduce thermal hyperalgesia and the expression of pro-inflammatory cytokines in the serum of rats [22]. In addition, Gua Sha can significantly inhibit inflammatory infiltration in the lung tissue of RR8-infected mice and down-regulate Matrix metalloproteinase-9 [23]. These findings, coupled with evidence that Gua Sha improves microcirculation [24], suggest that Gua Sha may have an inflammatory-reducing effect. However, further research is needed to elucidate the specific anti-inflammatory mechanisms of Gua Sha.

4.1.3. Gua Sha can improve flexibility

Fascial adhesions and stiffness are known contributors to pain and movement dysfunction. Gua Sha emerges as a promising myofascial release technique, with some researchers suggesting its effectiveness in improving flexibility for sedentary individuals and patients with Parkinson's disease [30]. Gua Sha appears to have a similar effect on flexibility as massage, acupuncture, and other myofascial release techniques. Research on the self-myofascial release of the lower back using a roller massager shows that Gua Sha improves fascial gliding, lumbar spine flexibility, and abdominal muscle strength compared to static stretching [31]. Supporting this notion, randomized clinical trials have shown that lumbar fascia stretching improves hamstring mobility [32]. Similarly, percussive massage therapy has been shown to enhance the flexibility of thoracolumbar fascia [33]. Additionally, studies have shown that self-myofascial release and lateral friction massage therapy effectively improve hamstring flexibility [34]. The pressure and friction applied during Gua Sha may mechanically disrupt fascial adhesions, promoting better extension and flexibility.

4.2. Possible mechanisms of Gua Sha on the fascia

The mechanisms by which Gua Sha affects fascia are still being explored, but several potential pathways have been proposed. These include:

4.2.1. Enhanced blood circulation and fascia remodeling

Fascia, a dense network of connective tissue, plays a critical role in body structure and movement [35]. Gua Sha's mechanical stimulation may influence fascia remodeling and blood circulation through several potential mechanisms. First, it increases blood flow and nutrient delivery. The scraping action of the Gua Sha tool induces dilation of fascial capillaries, enhancing blood flow and delivering essential nutrients and oxygen to fascial fibroblasts [24]. This improved nutrient supply may promote tissue repair and regeneration within the fascia. In addition, enhanced blood flow may affect the production of collagen and elastin, which are key components of fascia elasticity and flexibility [36]. Second, Gua Sha can enhance fibroblast activity. The mechanical stimulation of Gua Sha activates fibroblasts, which are responsible for producing collagen and elastin, the main components of fascia [37]. Collagen fibers provide a structural framework for fascia, while elastin fibers contribute to its elasticity and flexibility [36], [38]. Gua Sha may affect the balance between collagen synthesis and degradation by improving blood flow, thereby affecting the thickness and elasticity of fascia.

Finally, research demonstrates that blood circulation in fascial tissue may play a key role in maintaining the biomechanical, proprioceptive, and nociceptive functions of the thoracolumbar fascia [39], [40]. Reduced blood flow due to hypoxia may trigger fascial degeneration, characterized by stiffness, fibrosis, or thickening [41]. Gua Sha could theoretically counteract these degenerative processes by potentially improving blood flow. Further research is needed to explore the link between Gua Sha and fascial degeneration.

4.2.2. Improves lymph circulation and reduces inflammation

Gua Sha has anti-inflammatory properties, which may be largely attributed to its effects on the lymphatic system, which plays a vital role in removing waste and toxins. Research shows that the lymphatic system is critical in eliminating waste and toxins from the body. By reshaping the capillary network, Gua Sha enhances lymphatic drainage, promoting anti-inflammatory and antioxidant effects. Here's how it works:

Inflammation and oxidative stress can trigger the production of heme oxygenase-1 (HO-1), an enzyme with potent antioxidant, anti-inflammatory, and immunomodulatory properties in vascular cells [42]. Studies have shown that Gua Sha may upregulate HO-1, reflecting the body's antioxidant response [43]. In addition, restricted blood circulation may lead to inflammation due to a lack of oxygen [44], and Gua Sha can indirectly address this problem by improving blood flow. Clinical evidence further supports the effectiveness of Gua Sha in treating joint fascial inflammation in the neck, back, and feet [11], [12].

Animal experiments further elucidated the anti-inflammatory mechanism of Gua Sha. Studies have shown that Gua Sha can reduce thermal hyperalgesia and the expression of pro-inflammatory cytokines (IL-1β, IL-6, and TNF-α) in the serum of rats with lumbar disc herniation [22]. This suggests that Gua Sha may regulate inflammatory signaling pathways, contributing to its analgesic effects. In another study, Gua Sha significantly inhibited inflammatory infiltration in the lung tissue of RR8-infected mice and downregulated matrix metalloproteinase-9 (MMP-9) [23]. Downregulation of MMP-9, an enzyme involved in tissue breakdown and inflammation, suggests that Gua Sha may protect against lung injury. Overall, the anti-inflammatory effects of Gua Sha are supported by animal and clinical studies. Gua Sha's ability to enhance lymphatic drainage, upregulate HO-1, and modulate inflammatory signaling pathways may be part of its therapeutic effects.

4.2.3. Regulate nerves and relieve pain

Existing histological studies recognize the presence of abundant sensory nerves in fascia [39]. It is estimated that the entire fascia network of the human body has approximately 250 million nerve endings [45], which has led to fascia being considered the wealthiest sensory tissue in the human body. The sensory nerves in the fascia can conduct various stimuli from the surrounding environment, such as temperature, pressure, and pain. This information can be processed by the brain and fed back to the muscles to regulate muscle contraction and relaxation [45], making fascia the most prosperous sensory tissue in the human body.

The Gua Sha motion of Gua Sha stimulates nerve endings on the skin, which send signals to the brain to regulate the function of the central nervous system [17]. Gua Sha can stimulate nerve endings to release neurotransmitters and acetylcholine, and these neurotransmitters can regulate the activity of muscles and fascia [46]. Gua Sha releases endorphins, a natural analgesic substance that can relieve pain and improve muscle tone [47]. For example, Gua Sha can release endorphins and acetylcholine, a neurotransmitter that promotes muscle contraction and relaxation.

Animal studies have provided some initial insights into the neural mechanisms underlying Gua Sha therapy. Some studies have shown that rats' thoracolumbar fascia is innervating [48]–[51]. Inflammation within these fascial structures may lead to an increase in nociceptors (pain receptors), which may explain the experience of pain [22]. Interestingly, Gua Sha may affect the sympathetic nervous system, which regulates the body's stress response. This regulation may contribute to muscle tone and pain relief [52]. Overall, the abundance of sensory nerves in the fascia suggests that Gua Sha may play a role in modulating the nervous system and influencing pain perception. Animal studies provide preliminary support for this hypothesis, but further research is needed to fully understand the underlying mechanisms and clinical effects of Gua Sha for pain relief.

4.2.4. Mechanical stimulation of Gua Sha improves the flexibility of fascia

Similar to deep tissue massage, the pressure and friction of Gua Sha may mechanically affect the flexibility of the fascia. Fascial adhesions are areas of abnormal adhesion of the fascial layers that may limit mobility and cause pain and stiffness [53]. By applying pressure and friction, Gua Sha may stimulate mechanoreceptors in the fascia, which may trigger mechanotransduction pathways that influence fascial remodeling [35]. This process may involve breaking down fascial adhesions and promoting the production of lubricants such as hyaluronic acid, ultimately improving fascial gliding and range of motion [54].

Evidence for the effectiveness of mechanical fascia stimulation comes from studies of self-myofascial release and massage therapy. Researchers have found that self-myofascial release techniques and lateral friction massage can improve hamstring flexibility in various populations [31], [55]. Similarly, vibration therapy has been shown to increase back flexibility [56].

Gua Sha shares the same principles as these techniques and is a form of myofascial release. Previous studies have shown that Gua Sha may help break up fascial adhesions and restrictions, thereby potentially improving flexibility [30]. However, it must be acknowledged that research on the specific effects of Gua Sha on fascia is still in its early stages. Further experimental studies and clinical observations are needed to confirm and explore how Gua Sha may affect fascial flexibility.

4.3. Limitations and future research directions

This study included many RCTs and existing evidence shows that Gua Sha therapy has potential therapeutic effects on various diseases. However, the study also has some limitations that need to be improved

in future studies. The first limitation is that some studies may be biased due to a lack of blinding. Future studies should use strict blinding in RCTs to minimize placebo effects and therapist bias. In addition, studies often used different Gua Sha protocols, including variations in technique, duration, and intensity. This heterogeneity makes it challenging to compare the results of various studies. To address these issues, future studies should use standardized Gua Sha protocols to ensure consistency in application and facilitate comparison.

In addition, many studies focused on specific populations, limiting the generalizability of the findings. Future studies should include a broader range of participant demographics to assess the effectiveness of Gua Sha for different populations. Another limitation is that long-term benefit data are limited. Future studies with more extended follow-up periods are needed to determine the durability of the Gua Sha effect. Finally, the specific mechanism by which Gua Sha relieves pain remains unclear. Future research should delve deeper into the mechanisms of action of Gua Sha by exploring its effects on fascial properties, microcirculation, inflammatory factors, and pain pathways. In addition to these mechanistic studies, future research should examine the application of Gua Sha in various conditions beyond fascial disorders, including rehabilitation, aesthetics, and perhaps even psychological adjustment. In addition, it may be valuable to establish a solid theoretical framework for Gua Sha through research in traditional Chinese medicine, meridian science, and modern medicine. Standardizing Gua Sha's practice through protocols and technical guidelines could improve therapeutic efficacy and safety.

5. CONCLUSION

Gua Sha therapy demonstrates potential therapeutic benefits for various conditions, including pain reduction, inflammation mitigation, and enhanced flexibility. Preliminary evidence suggests that Gua Sha may influence the fascia through mechanisms such as improved blood circulation, decreased inflammation, neural modulation, and mechanical stimulation. However, the precise mechanisms underlying these effects require further investigation. Additionally, long-term outcomes and the clinical efficacy of Gua Sha in treating fascia-related conditions necessitate comprehensive studies to establish its role in modern healthcare.

ACKNOWLEDGEMENTS

Thanks to the Research Center in Back, Neck, Other Joint Pain and Human Performance (BNOJPH), Division of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University, Khon Kaen 40002, Thailand, for supporting the research facilities.

REFERENCES

[1] J. G. Varghese and G. A. G. H. Priya, "Role of fascia in human function," *Research Journal of Pharmacy and Technology*, vol. 10, no. 8, pp. 2759–2764, 2017, doi: 10.5958/0974-360X.2017.00489.9.

[2] K. H. S. Lam *et al.*, "Infraspinatus fascial dysfunction as a cause of painful anterior shoulder snapping: Its visualization via dynamic ultrasound and its resolution via diagnostic ultrasound-guided injection," *Diagnostics*, vol. 13, no. 15, p. 2601, Aug. 2023, doi: 10.3390/diagnostics13152601.

[3] M. A. Mohseni-Bandpei, M. Nakhaee, M. E. Mousavi, A. Shakourirad, M. R. Safari, and R. Vahab Kashani, "Application of ultrasound in the assessment of plantar fascia in patients with plantar fasciitis: A systematic review," *Ultrasound in Medicine & Biology*, vol. 40, no. 8, pp. 1737–1754, Aug. 2014, doi: 10.1016/j.ultrasmedbio.2014.03.001.

[4] C. Pirri *et al.*, "Ultrasound imaging of head/neck muscles and their fasciae: An observational study," *Frontiers in Rehabilitation Sciences*, vol. 2, p. 743553, Dec. 2021, doi: 10.3389/fresc.2021.743553.

[5] H. Tamartash, F. Bahrpeyma, and M. Mokhtari Dizaji, "Ultrasound evidence of altered lumbar fascia in patients with low back pain," *Clinical Anatomy*, vol. 36, no. 1, pp. 36–41, Jan. 2023, doi: 10.1002/ca.23964.

[6] C. Pirri *et al.*, "Ultrasound imaging of thoracolumbar fascia thickness: chronic non-specific lower back pain versus healthy subjects; A sign of a 'frozen back'?," *Diagnostics*, vol. 13, no. 8, p. 1436, Apr. 2023, doi: 10.3390/diagnostics13081436.

[7] K. Ushida *et al.*, "Intermittent pain in patients with chronic low back pain is associated with abnormalities in muscles and fascia," *International Journal of Rehabilitation Research*, vol. 45, no. 1, pp. 33–38, Mar. 2022, doi: 10.1097/MRR.0000000000000507.

[8] A. Nielsen, "Gua sha research and the language of integrative medicine," *Journal of Bodywork and Movement Therapies*, vol. 13, no. 1, pp. 63–72, Jan. 2009, doi: 10.1016/j.jbmt.2008.04.045.

[9] Y. Wang *et al.*, "Gua sha therapy for chronic low back pain," *Medicine*, vol. 99, no. 40, p. e20606, Oct. 2020, doi: 10.1097/MD.0000000000020606.

[10] J. W. M. Yuen *et al.*, "The effects of Gua sha on symptoms and inflammatory biomarkers associated with chronic low back pain: A randomized active-controlled crossover pilot study in elderly," *Complementary Therapies in Medicine*, vol. 32, pp. 25–32, Jun. 2017, doi: 10.1016/j.ctim.2017.03.010.

[11] R. Lauche *et al.*, "Randomized controlled pilot study: Pain intensity and pressure pain thresholds in patients with neck and low back pain before and after traditional East Asian 'Gua Sha' therapy," *The American Journal of Chinese Medicine*, vol. 40, no. 05, pp. 905–917, Jan. 2012, doi: 10.1142/S0192415X1250067X.

[12] A. Baburao Jadhav and P. Gurudut, "Comparative effectiveness of Gua sha, cryostretch, and positional release technique on tenderness and function in subjects with plantar fasciitis: A randomized clinical trial," *International Journal of Therapeutic Massage & Bodywork: Research, Education, & Practice*, vol. 16, no. 1, pp. 13–23, Mar. 2023, doi: 10.3822/ijtmb.v16i1.749.

[13] M. Braun *et al.*, "Effectiveness of traditional chinese 'Gua Sha' therapy in patients with chronic neck pain: A randomized controlled trial," *Pain Medicine*, vol. 12, no. 3, pp. 362–369, Mar. 2011, doi: 10.1111/j.1526-4637.2011.01053.x.

[14] F. J. Saha *et al.*, "Gua Sha therapy for chronic low back pain: A randomized controlled trial," *Complementary Therapies in Clinical Practice*, vol. 34, pp. 64–69, Feb. 2019, doi: 10.1016/j.ctcp.2018.11.002.
[15] T. P. Yamato, C. Maher, B. Koes, and A. Moseley, "The PEDro scale had acceptably high convergent validity, construct validity, and interrater reliability in evaluating methodological quality of pharmaceutical trials," *Journal of Clinical Epidemiology*, vol. 86, pp. 176–181, Jun. 2017, doi: 10.1016/j.jclinepi.2017.03.002.
[16] C. G. Maher, C. Sherrington, R. D. Herbert, A. M. Moseley, and M. Elkins, "Reliability of the PEDro scale for rating quality of randomized controlled trials," *Physical Therapy*, vol. 83, no. 8, pp. 713–721, Aug. 2003, doi: 10.1093/ptj/83.8.713.
[17] X. Xie *et al.*, "Effect of Gua Sha therapy on patients with diabetic peripheral neuropathy: A randomized controlled trial," *Complementary Therapies in Clinical Practice*, vol. 35, pp. 348–352, May 2019, doi: 10.1016/j.ctcp.2019.03.018.
[18] F. Meng *et al.*, "Effect of Gua sha therapy on perimenopausal syndrome: A randomized controlled trial," *Menopause*, vol. 24, no. 3, pp. 299–307, Mar. 2017, doi: 10.1097/GME.0000000000000752.
[19] J.-Y. Chiu, M.-L. Gau, S.-Y. Kuo, Y.-H. Chang, S.-C. Kuo, and H.-C. Tu, "Effects of Gua-Sha therapy on breast engorgement," *Journal of Nursing Research*, vol. 18, no. 1, pp. 1–10, Mar. 2010, doi: 10.1097/JNR.0b013e3181ce4f8e.
[20] Y. C. Xu *et al.*, "The effect of Gua Sha therapy on pain in parkinson's disease: A randomized controlled trial," *International Journal of General Medicine*, vol. Volume 17, pp. 2791–2800, Jun. 2024, doi: 10.2147/IJGM.S461958.
[21] Q.-Y. Xu, J.-S. Yang, B. Zhu, L. Yang, Y.-Y. Wang, and X.-Y. Gao, "The effects of scraping therapy on local temperature and blood perfusion volume in healthy subjects," *Evidence-Based Complementary and Alternative Medicine*, vol. 2012, p. 490292, 2012, doi: 10.1155/2012/490292.
[22] Y. Min, Z. Hongyan, Y. Rongzhao, S. Qinchuan, and B. Yaoyao, "Gua Sha attenuates thermal hyperalgesia and decreases proinflammatory cytokine expression in serum in rats with lumbar disc herniation induced by autologous nucleus pulposus," *Journal of Traditional Chinese Medicine*, vol. 38, no. 5, pp. 698–704, Oct. 2018, doi: 10.1016/S0254-6272(18)30908-7.
[23] W. Z. Tu *et al.*, "Combination treatment with Gua Sha and blood-letting causes attenuation of systemic inflammation, activated coagulation, tissue ischemia and injury during heatstroke in rats," *Chinese Journal of Integrative Medicine*, vol. 21, no. 8, pp. 610–617, 2015, doi: 10.1007/s11655-014-1816-4.
[24] A. Nielsen, N. T. M. Knoblauch, G. J. Dobos, A. Michalsen, and T. J. Kaptchuk, "The effect of Gua Sha treatment on the microcirculation of surface tissue: A pilot study in healthy subjects," *Explore*, vol. 3, no. 5, pp. 456–466, Sep. 2007, doi: 10.1016/j.explore.2007.06.001.
[25] Z. Wu *et al.*, "Myofascial release for chronic low back pain: A systematic review and meta-analysis," *Frontiers in Medicine*, vol. 8, p. 697986, Jul. 2021, doi: 10.3389/fmed.2021.697986.
[26] A. Bac, S. Kaczor, S. Pasiut, A. Ścisłowska-Czarnecka, A. Jankowicz-Szymańska, and K. Filar-Mierzwa, "The influence of myofascial release on pain and selected indicators of flat foot in adults: A controlled randomized trial," *Scientific Reports*, vol. 12, no. 1, p. 1414, Jan. 2022, doi: 10.1038/s41598-022-05401-w.
[27] Z. Chen, J. Wu, X. Wang, J. Wu, and Z. Ren, "The effects of myofascial release technique for patients with low back pain: A systematic review and meta-analysis," *Complementary Therapies in Medicine*, vol. 59, p. 102737, Jun. 2021, doi: 10.1016/j.ctim.2021.102737.
[28] M. Rodríguez-Huguet, J. L. Gil-Salú, P. Rodríguez-Huguet, J. R. Cabrera-Afonso, and R. Lomas-Vega, "Effects of myofascial release on pressure pain thresholds in patients with neck pain," *American Journal of Physical Medicine & Rehabilitation*, vol. 97, no. 1, pp. 16–22, Jan. 2018, doi: 10.1097/PHM.0000000000000790.
[29] Y. Shi, M. Huang, and H. Luo, "30 cases of cervico-shoulder myofascitis treated by meridian scraping therapy combined with pricking and cupping therapy," *International Journal of Clinical Acupuncture*, vol. 25, no. 4, pp. 278–280, 2016.
[30] M. de S. M. Barbalho and P. H. Moraes, "The effects of the Gua Sha technique (western view) on the flexibility of the posterior chain: series of cases," *Manual Therapy, Posturology & Rehabilitation Journal*, pp. 1–5, Jul. 2020, doi: 10.17784/mtprehabjournal.2016.14.373.
[31] Y. Nakai *et al.*, "Effect of self-myofascial release of the lower back on myofascial gliding, lumbar flexibility, and abdominal trunk muscle strength: A crossover study," *Sports*, vol. 11, no. 8, p. 147, Aug. 2023, doi: 10.3390/sports11080147.
[32] J. J. B. Ruiz, D. Perez-Cruzado, and R. P. Llanes, "Immediate effects of lumbar fascia stretching on hamstring flexibility: A randomized clinical trial," *Journal of Back and Musculoskeletal Rehabilitation*, vol. 36, no. 3, pp. 619–627, May 2023, doi: 10.3233/BMR-210274.
[33] C. Yang, X. Huang, Y. Li, W. Sucharit, P. Sirasaporn, and W. Eungpinichpong, "Acute effects of percussive massage therapy on thoracolumbar fascia thickness and ultrasound echo intensity in healthy male individuals: A randomized controlled trial," *International Journal of Environmental Research and Public Health*, vol. 20, no. 2, p. 1073, Jan. 2023, doi: 10.3390/ijerph20021073.
[34] M. Gala, P. Kulkarni, and A. Kumar, "Comparison of immediate effect of plantar fascia release by roller massager and transverse friction massage on hamstring flexibility in desk job workers," *International Journal of Physiotherapy and Research*, vol. 9, no. 4, pp. 3954–3959, Aug. 2021, doi: 10.16965/ijpr.2021.157.
[35] H. M. Langevin, "Fascia mobility, proprioception, and myofascial pain," *Life*, vol. 11, no. 7, p. 668, Jul. 2021, doi: 10.3390/life11070668.
[36] S. Kawamata, J. Ozawa, M. Hashimoto, T. Kurose, and H. Shinohara, "Structure of the rat subcutaneous connective tissue in relation to its sliding mechanism," *Archives of Histology and Cytology*, vol. 66, no. 3, pp. 273–279, 2003, doi: 10.1679/aohc.66.273.
[37] W. I. Hammer, "The effect of mechanical load on degenerated soft tissue," *Journal of Bodywork and Movement Therapies*, vol. 12, no. 3, pp. 246–256, Jul. 2008, doi: 10.1016/j.jbmt.2008.03.007.
[38] F. Grinnell, "Fibroblast mechanics in three-dimensional collagen matrices," *Journal of Bodywork and Movement Therapies*, vol. 12, no. 3, pp. 191–193, Jul. 2008, doi: 10.1016/j.jbmt.2008.03.005.
[39] S. Mense, "Innervation of the thoracolumbar fascia," *European Journal of Translational Myology*, vol. 29, no. 3, pp. 151–158, Sep. 2019, doi: 10.4081/ejtm.2019.8297.
[40] E. Wezenbeek *et al.*, "The role of the vascular and structural response to activity in the development of achilles tendinopathy: A prospective study," *The American Journal of Sports Medicine*, vol. 46, no. 4, pp. 947–954, Mar. 2018, doi: 10.1177/0363546517750854.
[41] L. Calanni, C. Zampella, P. Micheletti, D. Greco, M. Negro, and G. D'Antona, "Correlation between patellar tendon mechanical properties and oxygenation detection by near infrared spectroscopy in males," *Muscle Ligaments and Tendons Journal*, vol. 11, no. 1, pp. 54–61, Mar. 2021, doi: 10.32098/mltj.01.2021.06.
[42] J. A. Araujo, M. Zhang, and F. Yin, "Heme Oxygenase-1, Oxidation, inflammation, and atherosclerosis," *Frontiers in Pharmacology*, vol. 3, p. 119, 2012, doi: 10.3389/fphar.2012.00119.
[43] K. K. Kwong *et al.*, "Bioluminescence imaging of Heme Oxygenase-1 upregulation in the Gua Sha procedure," *Journal of Visualized Experiments*, no. 30, p. e1385, Aug. 2009, doi: 10.3791/1385.

[44] A. Brandl, C. Egner, R. Reer, T. Schmidt, and R. Schleip, "Immediate effects of myofascial release treatment on lumbar microcirculation: A randomized, placebo-controlled trial," *Journal of Clinical Medicine*, vol. 12, no. 4, p. 1248, Feb. 2023, doi: 10.3390/jcm12041248.
[45] C. Fede *et al.*, "Innervation of human superficial fascia," *Frontiers in Neuroanatomy*, vol. 16, p. 981426, Aug. 2022, doi: 10.3389/fnana.2022.981426.
[46] C. Wilson, M. D. Lee, and J. G. McCarron, "Acetylcholine released by endothelial cells facilitates flow-mediated dilatation," *The Journal of Physiology*, vol. 594, no. 24, pp. 7267–7307, Dec. 2016, doi: 10.1113/JP272927.
[47] A. H. Ali, H. S. Ahmed, A. S. Jawad, and M. A. Mustafa, "Endorphin: function and mechanism of action," *Science Archives*, vol. 02, no. 1, pp. 9–13, 2021, doi: 10.47587/SA.2021.2102.
[48] S. Mense and U. Hoheisel, "Evidence for the existence of nociceptors in rat thoracolumbar fascia," *Journal of Bodywork and Movement Therapies*, vol. 20, no. 3, pp. 623–628, Jul. 2016, doi: 10.1016/j.jbmt.2016.01.006.
[49] U. Hoheisel, J. Rosner, and S. Mense, "Innervation changes induced by inflammation of the rat thoracolumbar fascia," *Neuroscience*, vol. 300, pp. 351–359, Aug. 2015, doi: 10.1016/j.neuroscience.2015.05.034.
[50] J. Tesarz, U. Hoheisel, B. Wiedenhöfer, and S. Mense, "Sensory innervation of the thoracolumbar fascia in rats and humans," *Neuroscience*, vol. 194, pp. 302–308, Oct. 2011, doi: 10.1016/j.neuroscience.2011.07.066.
[51] S. M. Corey, M. A. Vizzard, G. J. Badger, and H. M. Langevin, "Sensory innervation of the nonspecialized connective tissues in the low back of the rat," *Cells Tissues Organs*, vol. 194, no. 6, pp. 521–530, 2011, doi: 10.1159/000323875.
[52] M. S. Lee, T.-Y. Choi, J.-I. Kim, and S.-M. Choi, "Using Guasha to treat musculoskeletal pain: A systematic review of controlled clinical trials," *Chinese Medicine*, vol. 5, p. 5, 2010, doi: 10.1186/1749-8546-5-5.
[53] W. Klingler, M. Velders, K. Hoppe, M. Pedro, and R. Schleip, "Clinical relevance of fascial tissue and dysfunctions," *Current Pain and Headache Reports*, vol. 18, p. 439, Aug. 2014, doi: 10.1007/s11916-014-0439-y.
[54] R. L. Pratt, "Hyaluronan and the fascial frontier," *International Journal of Molecular Sciences*, vol. 22, no. 13, p. 6845, Jun. 2021, doi: 10.3390/ijms22136845.
[55] R. A. Capobianco, M. M. Mazzo, and R. M. Enoka, "Self-massage prior to stretching improves flexibility in young and middle-aged adults," *Journal of Sports Sciences*, vol. 37, no. 13, pp. 1543–1550, Jul. 2019, doi: 10.1080/02640414.2019.1576253.
[56] L. A. Siegmund, J. E. Barkley, D. Knapp, and K. S. Peer, "Acute effects of local vibration with biomechanical muscle stimulation on low-back flexibility and perceived stiffness," *Athletic Training & Sports Health Care*, vol. 6, no. 1, pp. 37–45, Jan. 2014, doi: 10.3928/19425864-20140115-01.

BIOGRAPHIES OF AUTHORS

Beibei Wang is a doctoral candidate in exercise and sports science at Khon Kaen University in Thailand. She is particularly interested in the sports of the human body and physical therapy. Her main research directions are Gua Sha, fascia, and rehabilitation training. She can be contacted at email: beibei.w@kkumail.com.

Hongxiu Chen is a female Ph.D. in Sport and Exercise Science, Khon Kaen University, Thailand. Her main research interests are massage, myopia prevention and treatment, vision training, visual fatigue, and human body movement. She can be contacted at email: hongxiu.c@kkumail.com.

Wichai Eungpinichpong is a professor and doctoral supervisor at the Department of Physical Therapy, Faculty of Medicine, Khon Kaen University, Thailand. He is a highly cited researcher and expert in physical therapy and rehabilitation, specializing in Thai massage and its application in various health conditions. He has conducted extensive research on the effects of Thai massage on physical and mental health, publishing numerous articles in peer-reviewed journals. His research explores the benefits of Thai massage for conditions such as chronic pain, headaches, stress, and balance issues. Professor Eungpinichpong's research has been recognized nationally and internationally, and he is considered a leading figure in Thai massage research. He can be contacted at email: wiceun@kku.ac.th.