PHYSIOLOGICAL EFFECTS OF THE GUA SHA MASSAGE: SCIENTIFIC REVIEW

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Abstract

Objective:

The objective of the review article is to summarize and systematize available scientific data on the physiological effects of Gua Sha massage as well as to formulate a hypothesis regarding the systemic effect it has on the body.

Data sources:

The data was taken from research articles published in Russian and English from 2004 to 2024. The sources included 33 randomized clinical trials, three comparative studies, seven scientific reviews, two systematic reviews, three clinical cases, and one dissertation for a doctorate in Pedagogical Sciences (specialty: physical education, sports training, recreational education, and adaptive physical education theory and methodology).

Study selection:

The authors reviewed 120 sources published over the last 50 years and available in the Scopus, Medline, and Elibrary bibliographic databases using the search terms “gua sha” and “Gua Sha”. The 49 most relevant publications, books authored by competent Gua Sha practitioners and research articles in peer-reviewed scientific journals, were selected for analysis.

Results:

An analysis of the literature brought to light that there are a multitude of physiological effects that Gua Sha massage provides, including immunostimulatory, antioxidant, anti-inflammatory, analgesic, hepatoprotective, reflex, and microcirculatory effects. A hypothesis was formulated on the integral mechanism of the gua sha massage: catalyzation of blood circulation during massage activates metabolic processes in the tissues, enhances lymphatic formation as well as lymphatic outflow, and stimulates detoxification processes, which combine to produce a regenerating, rejuvenating effect on the body.

Conclusions:

A more accurate scientific substantiation of this technique calls for further clinical research, as not all studies support the effectiveness of Gua Sha massage, and the mechanism of the effect it has on the body is not fully understood. The method must be exercised with caution, as cases have been recorded in which the trauma procedure has resulted in developing complications.

Introduction

The Gua Sha massage, performed by a special scraper, is currently a widespread procedure used in clinical practice and cosmetology. The idea of the method is to perform a surface friction technique (called *Gua*) which produces petechiae and millet-like skin rashes (called *Sha*). The Gua Sha massage is an example of a Chinese traditional medicine technique [1], which is also actively used in traditional healthcare. This method is very popular in China. For instance, a survey was conducted among 3,209 people. 22.7% of the survey respondents said they had received a Gua Sha massage in the past year while 6.6% stated that they had resorted to long-term (four weeks) procedures. It is prescribed for such indications as infectious diseases, strokes, fevers, digestive disorders, edemas, neurotic disorders, and much more [2]. According to E. Rogers et al. [3], 31% of the population opts for integrative medicine methods such as acupuncture, osteopathic manipulative treatment (OMT), and the Gua Sha massage.

In light of the many years that it has been in use, the method has earned the trust of doctors and patients alike. For example, one of the proofs of the method's effectiveness is a patent that was obtained for the invention of massaging devices, such as massage plates similar to a Gua Sha scraper [4].

Currently available scientific literature has been analyzed to evaluate all the positive effects of the Gua Sha massage. The review has included data from 33 randomized clinical trials, three comparative studies, seven scientific reviews, two systemic reviews, three clinical cases, and one dissertation for Doctoral Degree in Physical Education.

Physiological effects of the Gua Sha massage

An analysis of the literature showed that the Gua Sha massage results in multiple physiological effects. These include immunostimulating, antioxidant, anti-inflammatory, analgesic, restorative, hepatoprotective, reflex, endocrine, and microcirculatory changes.

All these effects are described below.

1. Immunostimulating effect

The Gua Sha massage can be classified as a nonspecific immunostimulant that activates the body's defenses. For instance, T. Chen et al. (2016) demonstrated the immunostimulating effect of Gua Sha massage, i.e. increasing the production of antibodies and T-helper cells [5]. This activation mechanism is characterized by damage to tissues and vascular walls when exposed to a scraper, which leads to the diapedesis of erythrocytes and hemolysis. The hemolysis products, in turn, exhibit a stimulating effect on the immune response. Furthermore, the Gua Sha massage has an immunomodulatory effect, i.e. increasing the effectiveness of intradermally administered vaccines [5].

2. Antioxidant effect

The pathogenesis of the antioxidant effect's development was found to be quite complex. The Gua Sha massage causes damage to and ruptures capillaries, resulting in hemorrhaging (petechiae and ecchymosis). Consequently, red blood cells released into the intercellular space are hemolyzed, and further effects of Gua Sha feature the release of hemolysis-derived products. Those include hemoglobin and its derivatives: bilirubin, carbon monoxide (CO), and Fe^{2+}. Macrophages absorb hemoglobin released from erythrocytes, after the destruction of which they release the enzyme heme oxygenase-1, which is a marker of oxidative stress activity [6]. Heme oxygenase-1 destroys the center of hemoglobin, i.e. heme (*the heme iron protoporphyrin IX is a large complex including a heme ring [protoporphyrin IX] and a divalent iron atom [Fe^{2+}] located at the center of the ring).* As a result of these enzymatic reactions, heme oxygenase-1 converts heme into biliverdin and carbon monoxide (CO is carbon monoxide), and biliverdin then is transformed into bilirubin, which interacts with oxygen free radicals and is oxidized back to biliverdin. This cycle of biliverdin's conversion to bilirubin allows for a reduction in the concentration of reactive oxygen species. Heme oxygenase-1 induces a release of divalent iron Fe^{2+} from heme, which, under the impact of reactive oxygen species, is oxidized to Fe^{3+} (thus, Fe^{2+} reduces the severity of oxidative stress through the use of reactive oxygen species). Carbon monoxide (CO) is produced during heme metabolism and features anti-inflammatory, anti-apoptotic, and antiproliferative effects. These effects are the result of CO stimulating the release of interleukin-10 (IL-10) by way of macrophages, which is an anti-inflammatory cytokine: it suppresses the production

of inflammatory cytokines such as interleukin-1 beta (IL-1β), interleukin 6 (IL-6), interleukin 8 (IL-8), and tumor necrosis factor-alpha (TNF-α). Thus, the Gua Sha massage's antioxidant effect is achieved through the action of 3 chemical agents, i.e. bilirubin, iron, and carbon monoxide [7].

3. Anti-inflammatory effect

The anti-inflammatory effect of the Gua Sha massage has to do with a decrease in the production of pro-inflammatory cytokines — biologically active substances that cause inflammation to develop [8]. As an example, an experimental study showed a decrease in the production of interleukin-1, interleukin-6, and TNF (tumor necrosis factor) [9]. Also, a decrease in the production of pro-inflammatory cytokines was observed in assessing inflammatory response in clinical practice when examining elderly patients with chronic back pain [10].

The experiment showed the complex, adaptive effect Gua Sha has, based on anti-inflammatory, anticoagulant, and anti-ischemic effects (i.e. the massage reduced the concentration of inflammatory mediators, had an anticoagulant effect, reduced thrombus formation, and restored arterial blood flow) [11].

In addition, a decrease in the systemic inflammatory response after the Gua Sha massage has been observed at the genetic level. In particular, the massage was discovered to activate the genes responsible for tissue repair after mechanical damage [12].

4. Analgesic effect

One of the most important effects the Gua Sha massage has is its pain relief. The widespread use of the massage in clinical practice precisely stems from its ability to reduce pain. It was initially used for pain relief when the muscles and musculoskeletal system were affected.

From 1959 to 2006, seven randomized clinical trials were carried out. The Gua Sha massage accounted for pain reduction in the fibromyalgia [13], scapular periarteritis [14], chronic low back pain [10, 15-18], headaches [19], neck pain [17, 20], breast engorgement during lactation [21, 22, 23], musculoskeletal pain [24], and plantar fasciitis [25].

Currently, the mechanism of the Gua Sha massage's analgesic effect can be explained as follows.

Firstly, the effect of the Gua Sha massage is tracked by mediators with an analgesic effect. Such substances include nitric oxide, which relaxes the vascular wall muscles, increases oxygen delivery, restores nerve innervation, and acts as a mild opioid; β-endorphin, which is an endogenous opiate; and interleukin-10, which blocks the severity of the inflammatory response, which is accompanied by a decrease in swelling and improved blood circulation in the massaged area [7].

Secondly, pain modulation occurs due to the activation of the counter-irritation mechanism (*the gate control theory of pain* by Melzack).

Counterirritation is the artificial irritation of the skin on a certain area of the body to relieve painful irritation (pain) in other parts of the body.

During the Gua Sha massage, mechanoreceptors are stimulated, which are sensory receptors activated by mechanical pressure, friction, or rubbing. Signals from mechanoreceptors (mechanical) or nociceptors (pain) simultaneously enter the dorsal horn of the spinal cord. Compared to pain receptors, mechanoreceptors are characterized by a lower activation threshold, which activates their electrical activity. They generate action potentials that activate nearby interneurons. Association neurons suppress the activity of sensory neurons that transmit pain signals to the central nervous system, thus resulting in the suppression of pain sensation. Thus, by irritating the mechanoreceptors, Gua Sha massage causes an increase in their electrical activity, which leads, through the activation of associated neurons, to the suppression of pain sensation (antinociceptive effect).

Thirdly, the analgesic effect is achieved due to the scraper's impact on specific pain receptors—nociceptors—which has been described in several publications [26, 27, 28].

Researchers have described dozens of biologically active substances, the impact of which leads to the sensation of pain. The Gua Sha massage, due to mechanical friction and tissue damage, results in the

accumulation of biologically active substances, such as histamines, serotonin, interleukins, and the tumor necrosis factor. These substances are typically released by cells involved in the immune and inflammatory response. However, the exact mechanism of the impact that the Gua Sha scraper has on these receptors is not completely clear.

It is hypothesized that the mechanical stimulation of nociceptors blocks the perception of the chemical signal and nerve cells cease to perceive pain. A unique chain of pathogenetic reactions is brought about with the following therapeutic effect: To achieve an analgesic effect, one first needs to cause damage (preferably minor) to tissues and cause the release of pain mediators but at the same time—due to mechanical irritation—suppress the susceptibility of nociceptors to the effects of pain chemical signals.

4. **Restorative effect**

The restorative effect of the Gua Sha massage has entered into everyday use in various fields of medicine.

Firstly, the Gua Sha massage is used as a restorative procedure in sports medicine. For example, after competitions, this massage improves the well-being of athletes, reduces fatigue, and also contributes to the replenishment of muscle tissue structure [29, 30].

Secondly, the Gua Sha massage has also been proven effective in treating insomnia. A randomized controlled trial demonstrated that the Gua Sha massage accounted for normalization of sleep and a significant reduction in the frequency of that sleeping pills had to be taken [31].

Thirdly, the Gua Sha massage is also used to normalize blood pressure. Studies show a significant decrease in blood pressure following the massage [32, 33, 34].

Fourthly, Gua Sha massage is used as an auxiliary method for restoring motor and sensory function in patients as part of a complex of rehabilitation measures following strokes [35, 36]. The method's effectiveness was confirmed by Zhang Hai Jiao in his Doctoral Dissertation [37]. In patients who have suffered a stroke, the massage accounted for the gradual regaining of sensitivity, motor activity, and muscle contraction strength.

There are separate observations from utilizing Gua Sha massage to treat neurological disorders. Among these, a decrease has been described in the severity of nervous tics in Gilles de la Tourette's syndrome (GTS) [38].

5. Hepatoprotective effect

An analysis of the literature has shown that Gua Sha massage can also have a positive effect on the activity of viscera. In particular, it has a hepatoprotective effect, which consists of activating the repair processes in the liver tissue owing to a decrease in the concentration of pro-inflammatory cytokines and suppression of systemic inflammation processes [39, 40].

6. Reflexive effect

The reflexive impact of the Gua Sha massage features has been described in many textbooks and monographs [41]. Its influence on tissues irritates the cellular receptor apparatus (mechanoreceptors, thermoreceptors, tactile receptors). The signal from the receptors travels along sensory nerve fibers to the brain (subcortical centers and the cerebral cortex), where each organ has its own unique receptor representation. Optimal stimulation of a certain receptive field by way of a short massage brings the nerve center into a state of excitation (stimulating effect of a short-term massage). When the number of impulses coming from various receptors is too high, or they are delivered for a long time, inhibition develops in the nerve center (calming and relaxing effect of a long massage).

Then, from the nerve centers, impulses are delivered to the periphery reaching the muscles, blood vessels, and internal organs through the motor nerves, which causes a corresponding reflexive reaction, manifested by a change in their vital functioning. This reaction is called the dermato-visceral reflex. This may explain the systemic effect that the Gua Sha massage has (the appearance of a feeling of calm and relaxation, normalization of sleep, and general well-being).

7. Effect on the endocrine system

The Gua Sha massage has shown effectiveness in the treatment and correction of several endocrine diseases and disorders.

In one study among 60 patients with diabetic neuropathy, therapy based on the Gua Sha massage reduced the severity of neurological manifestations, improved sensory function, and increased peripheral blood flow. Researchers note a normalization of plasma glucose levels as well [42].

The Gua Sha massage reduces the severity of perimenopausal syndrome. Based on the results of six randomized controlled trials with a total of 438 women, it proved to normalize the levels of follicle-stimulating (FSH) and luteinizing (LH) hormones, which manifested as an improvement in the functioning of the female reproductive system: sweating and the severity of hot flashes decreased while their emotional state normalized. Researchers also found that combining the Gua Sha massage with hormone replacement therapy yielded better results compared to hormone therapy alone [43, 44].

The Gua Sha massage also exhibited positive effects in correcting hypothyroidism [45, 46]. The study involved two arms of patients suffering from subclinical hypothyroidism. Subjects from one arm received hormone replacement therapy while those from the other one were additionally administered acupuncture and Gua Sha scraper treatment in the area of the cervical and thoracic spine related to the autonomic innervation of the thyroid gland.

Subjects additionally administered acupuncture and a Gua Sha massage along with hormone replacement therapy showed significant improvement in their well-being and cardiovascular system parameters while swelling decreased and improved the skin quality.

8. Microcirculatory effect

The microcirculatory effect of the Gua Sha massage is considered to be one of the fundamental effects since the improvement of blood flow in the massaged area promotes activation of all of the effects mentioned above [14].

However, despite the significance of this effect, its value in Gua Sha massage is seldom brought to light in studies. The article by A. Nielson et al. is almost the only work [47, 48] that proved a four-times increase of blood flow through the vessels in the back area after a Gua Sha massage. However, apart from this study, no actual confirmation of the activation of microcirculation during Gua Sha massage has been presented.

To confirm the hypothesis of an increase in blood perfusion in the massaged area, employees of three scientific institutions (National Medical Research Center for Rehabilitation and Balneology of the Ministry of Health of Russian Federation, M.F. Vladimirsky Moscow Regional Clinical Research Institute (MONIKI), and REVITONICA Neuromuscular Rehabilitation) conducted a clinical study of 15 women aged 43 to 50. The study involved three stages: At stage one, each woman received a Gua Sha massage for five minutes using a jade scraper in their forehead areas; at stage two, blood flow velocity was measured using an optical signal on the skin's surface; while at stage three, tissue perfusion studies were performed every five minutes for an hour. The obtained results exhibited a significant increase in blood flow velocity in the massaged area and long-term preservation of tissue perfusion after the massage [Figure 1, 2, 3] [49].

Conclusion

All of the above-mentioned effects have a complex effect on the human body.

The overall effect of the Gua Sha massage can be represented as follows: the impact of the scraper brings about a sharp expansion of the blood vessels and helps increase the permeability of the vascular walls. The release (diapedesis) of red blood cells from the vessels into the tissues increases, which is accompanied by the formation of petechiae and ecchymoses and activates the antioxidant protection processes. There is a persistent increase in blood flow in the massaged area. As a result, tissue damage leads to the accumulation of biologically active substances, such as histamines, serotonin, interleukins, and the tumor necrosis factor. These substances change the sensitivity of pain receptors and block the conduction of pain. In addition, increased blood flow activates metabolic processes in tissues, lymph

formation, and detoxification processes as the drainage effect increases, which together all yield a regenerating and rejuvenating effect. A. Dubinskaya provided a detailed description of the effect of massage techniques on restoring collagen structure and reducing the severity of fibrosis [50]. The Gua Sha massage may have a similar effect as well.

However, not all studies stand behind the effectiveness of the Gua Sha massage. Thus, Myeong Soo Lee et al. [51] provide data that do not testify to the effectiveness of Gua Sha massage and suggest the need for additional research to provide a scientific background for the use of this method.

Qi-ling Yuan et al. [18] also report a lack of evidence for the method's effectiveness. The conclusion has been made based on an analysis of data from 75 randomized controlled trials (n=11,077).

Moreover, one must be careful in applying the method, since cases of traumatic procedures have been observed entailing the development of complications (massive hemorrhaging, hematomas, and muscle damage) [52, 53].

Possible complications of the massage may include dermatological reactions reminiscent of lichen planus [54].

Thus, the provided evidence base allows for an affirmative assessment of the effectiveness of the Gua Sha massage, although further clinical trials will be required for a more accurate scientific substantiation of this technique.

Data sharing

No additional data is available.

References

1. Samoilova L. Chinese Gua Sha massage. Pan Hemin School (in Russian). In: Liang Feng, editor. St. Petersburg: Piter Publishing House; 2004.

2. Lam CT, Tse SH, Chan ST, Tam JK, Yuen JW. A survey on the prevalence and utilization characteristics of gua sha in the Hong Kong community. Complement Ther Med 2015;23(1):46-54. doi: 10.1016/j.ctim.2014.12.002

3. Rogers E, Baker J, Beutler A, Witkop C, Leggit JC. Injury and illness surveillance during the 2016 Department of Defense Warrior Games: review of methods and results. Mil Med 2019;184(11-12):e616-21. doi: 10.1093/milmed/usz063

4. Dubov VA, inventor. A set of devices for massage and a method of performing massage (in Russian). Russian Federation patent RU 2682995 C1. March 25, 2019. Available from: https://www.elibrary.ru/item.asp?id=37358727. [Last accessed on 2024 Oct 07].

5. Chen T, Liu N, Liu J, Zhang X, Huang Z, Zang Y, et al. Gua Sha, a press-stroke treatment of the skin, boosts the immune response to intradermal vaccination. PeerJ 2016;4:e2451. doi: 10.7717/peerj.2451

6. 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. doi: 10.3791/1385

7. Chu EC, Wong AY, Sim P, Krüger F. Exploring scraping therapy: Contemporary views on an ancient healing – A review. Journal of family medicine and primary care 2021; 10(8):2757-2762. doi: 10.4103/jfmpc.jfmpc_360_21

8. Zhang JM, An J. Cytokines, Inflammation and Pain. Int Anesthesiol Clin 2007;45(2):27-37. doi: 10.1097/aia.0b013e318034194e

9. Yang M, Zhang H, Yue R, Shi Q, Bian Y. Gua Sha attenuates thermal hyperalgesia and decreases proinflammatory cytokine expression in serum in rats with lumbar disc herniation induced by autologous nucleus pulposus. J Tradit Chin Med 2018;38(5):698-704. doi 10.1016/s0254-6272(18)30908-7

10. Yuen JW, Tsang WW, Tse SH, Loo WT, Chan ST, Wong DL, 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. Complement Ther Med 2017;32:25-32. doi: 10.1016/j.ctim.2017.03.010

11. Tu WZ, Cheng RD, Hu J, Wang JZ, Lin HY, Zou EM, 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. Chin J Integr Med 2015;21(8):610-7. doi: 10.1007/s11655-014-1816-4

12. Zou B, Du J, Xuan Q, Wang Y, Wang Z, Zhang W, et al. Scraping Therapy Improved Muscle Regeneration through Regulating GLUT4/Glycolytic and AMPK/mTOR/4EBP1 Pathways in Rats with Lumbar Multifidus Injury. Pain Res Manag. 2023;2023:8870256. doi: 10.1155/2023/8870256

13. Nielsen A, Kligler B, Koll BS. Safety protocols for gua sha (press-stroking) and baguan (cupping). Complement Ther Med 2012;20(5):340-4. doi: 10.1016/j.ctim.2012.05.004

14. Tsolin VA, Khazron DS. Chinese Massage — Gua Sha. Science in the Modern Information Society. Proceedings of the XXII international scientific and practical conference, Vol 2 (in Russian). 2018 Nov 12–13; North Charleston, USA. pp. 10–12 Available from: https://www.elibrary.ru/item.asp?id=36547932. [Last accessed on 2024 Oct 07].

15. Saha FJ, Brummer G, Lauche R, Ostermann T, Choi KE, Rampp T, et al. Gua Sha therapy for chronic low back pain: A randomized controlled trial. Complement Ther Clin Pract 2019;34:64-69. doi: 10.1016/j.ctcp.2018.11.002

16. Wang YW, Xi ZW, Pu B, Chen GY, Ma YF, Liu DL, et al. Gua sha therapy for chronic low back pain: A protocol for systematic review. Medicine (Baltimore). 2020;99(40):e20606. doi: 10.1097/md.0000000000020606

17. Lauche R, Wübbeling K, Lüdtke R, Cramer H, Choi KE, Rampp T, 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. Am J Chin Med 2012;40(5):905-917. doi: 10.1142/s0192415x1250067x

18. Yuan QL, Guo TM, Liu L, Sun F, Zhang YG. Traditional Chinese medicine for neck pain and low back pain: a systematic review and meta-analysis. PLoS One 2015;10(2):e0117146. doi: 10.1371/journal.pone.0117146

19. Schwickert ME, Saha FJ, Braun M, Dobos GJ. Gua Sha for migraine in inpatient withdrawal therapy of headache due to medication overuse. Forsch Komplementmed 2007;14(5):297-300. doi:10.1159/000107731

20. Braun M, Schwickert M, Nielsen A, Brunnhuber S, Dobos G, Musial F, et al. Effectiveness of traditional Chinese "gua sha" therapy in patients with chronic neck pain: a randomized controlled trial. Pain Med 2011;12(3):362-369. doi: 10.1111/j.1526-4637.2011.01053.x

21. 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):1-10. doi: 10.1097/jnr.0b013e3181ce4f8e

22. Chiu CY, Chang CY, Gau ML. An experience applying Gua-Sha to help a parturient women with breast fullness (in Chinese). Hu Li Za Zhi 2008 Feb;55(1):105-10 Available from: https://pubmed.ncbi.nlm.nih.gov/18270940/. [Last accessed on 2024 Oct 07].

23. Amudha N, Prakash D. Gua-Sha therapy on breast engorgement among Indian postnatal mothers. Bioinformation 2023;19(8): 853-9. doi: 10.6026/97320630019853

24. Hartnett DA. Gua sha therapy in the management of musculoskeletal pathology: a narrative review. Physical therapy reviews 2022;27(3):169-75. doi: 10.1080/10833196.2021.2011581

25. Lee TL, Marx BL. Noninvasive, Multimodality Approach to Treating Plantar Fasciitis: A Case Study. J Acupunct Meridian Stud 2018;11(4):162-164. doi: 10.1016/j.jams.2018.04.002

26. Spohn D, Musial F, Rolke R. Naturopathic reflex therapies for the treatment of chronic pain - Part 2: Quantitative sensory testing as a translational tool. Forsch Komplementmed 2013;20(3):225-30. doi: 10.1159/000353446

27. Musial F, Michalsen A, Dobos G. Functional chronic pain syndromes and naturopathic treatments: neurobiological foundations. Forsch Komplementmed 2008;15(2):97-103. doi: 10.1159/000121321

28. Musial F, Spohn D, Rolke R. Naturopathic reflex therapies for the treatment of chronic back and neck pain - Part 1: Neurobiological foundations. Forsch Komplementmed 2013;20(3):219-24. doi: 10.1159/000353392

29. 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(4):575-81. Available from: https://pubmed.ncbi.nlm.nih.gov/32186106/. [Last accessed on 2024 Oct 07].

30. Wang X, Chen P, Huang X, Wang Y, Yang J, Wichai E, et al. Guasha improves the rating of perceived exertion scale score and reduces heart rate variability in male weightlifters: a randomized controlled trial. J Tradit Chin Med 2017;37(1):49-56. doi: 10.1016/s0254-6272(17)30026-2

31. Yan L, Jiang L, Liu Y, Chen Y, Zhong J, Luo D. Therapeutic Efficacy of Head Gusha Combined with Kaitianmen in the Management of Insomnia. Altern Ther Health Med. 2024;30(1):88-93. Available from: https://pubmed.ncbi.nlm.nih.gov/37820682/. [Last accessed on 2024 Oct 07].

32. Zhu ZG, Wang JR, Pan XY. Efficacy of scraping therapy on blood pressure and sleep quality in stage I and II essential hypertension: A systematic review and meta-analysis. J Integr Med. 2024;22(1):12-21. doi: 10.1016/j.joim.2023.11.006

33. Liu H, Liu Z, Wang Y, Chen Y, Wu Y, Yang J. Aging law on anti-hypertensive effect of scrapping therapy on primary hypertension (in Chinese). Zhongguo Zhen Jiu 2015;35(7):711-4. Available from: https://pubmed.ncbi.nlm.nih.gov/26521590/. [Last accessed on 2024 Oct 07].

34. Gong Y, Wang D, Liang Y, Dai Y, Guo C. Study on the clinical effect of Hufu Tongbian scraping on hypertension with hyperactivity of liver fire. Journal of Cardiovascular Rehabilitation Medicine 2022;31(4):475-9. doi: 10.3969/j.issn.1008-0074.2022.04.18

35. Popov SN, Bushkova YV, Haijiao Z. Gua Sha massage in a complex differentiated method of rehabilitation of patients with cerebral ischemic stroke at the inpatient stage of recovery (in Russian). Exercise Therapy and Sports Medicine 2009;9(69):15-21. Available from: https://www.elibrary.ru/item.asp?id=12981309. [Last accessed on 2024 Oct 07].

36. Haijiao Z. Comprehensive differentiated program of physical rehabilitation of patients with cerebral ischemic stroke at the inpatient stage (in Russian). Theory and Practice of Physical Culture 2010;2:24. Available from: https://www.elibrary.ru/item.asp?id=13527934. [Last accessed on 2024 Oct 07].

37. Zhang HJ. Chinese reflex Gua Sha massage in complex differentiated rehabilitation of patients with cerebral ischemic stroke in the acute period of the disease at the inpatient stage of rehabilitation (in Russian) [dissertation]. Moscow: Russian University of Sport "GTSOLIFK", 2002. Available from: https://nauka-pedagogika.com/pedagogika-13-00-04/dissertaciya-kitayskiy-reflektornyy-massazh-gua-sha-v-kompleksnoy-differentsirovannoy-reabilitatsii-bolnyh-tserebralnym-ishemicheskim-. [Last accessed on 2024 Oct 07].

38. Lee MH. A Single Case of Tourette's Syndrome Treated with Traditional Chinese Medicine. J Acupunct Meridian Stud 2017;10(1):55-61. doi: 10.1016/j.jams.2016.12.005

39. 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(17-18):1686-8. doi: 10.1016/j.cca.2011.05.009

40. Chan ST, Yuen JW, Gohel MD, Wong HC, Chung CP, Sun Y, et al. Does guasha offer hepatoprotective effect to chronic inactive hepatitis B carriers? A built-in design to control subject expectation. Journal of alternative and complementary medicine (New York, N.Y.) 2013;19(9):772-6. doi: 10.1089/acm.2012.0186

41. Dubrovsky VI. Therapeutic massage: physical education textbook for secondary schools and higher education institutions. – 4th ed, expanded. – Moscow: Humanitarian publ. center VLADOS; 2005.

42. Xie X, Lu L, Zhou X, Zhong C, Ge G, Huang H, et al. Effect of Gua Sha therapy on patients with diabetic peripheral neuropathy: A randomized controlled trial. Complement Ther Clin Pract 2019;35:348-352. doi: 10.1016/j.ctcp.2019.03.018

43. Ren Q, Yu X, Liao F, Chen X, Yan D, Nie H, et al. Effects of Gua Sha therapy on perimenopausal syndrome: A systematic review and meta-analysis of randomized controlled trials. Complement Ther Clin Pract 2018;31:268-277. doi: 10.1016/j.ctcp.2018.03.012

44. Meng F, Duan PB, Zhu J, Lou QQ, Fang ZH, An HL, et al. Effect of Gua sha therapy on perimenopausal syndrome: a randomized controlled trial. Menopause 2017;24(3):299-307. doi: 10.1097/gme.0000000000000752

45. Luzina KE, Luzina LL, Vasilenko AM, Niu X. Acupuncture as an alternative to replacement therapy for subclinical hypothyroidism (in Russian). Bulletin of Rehabilitation Medicine 2012;3(49):57-60. Available from: https://www.elibrary.ru/item.asp?id=17897566. [Last accessed on 2024 Oct 07].

46. Luzina KE, Luzina LL, Vasilenko AM. The influence of acupuncture on the quality of life and the level of thyroid-stimulating hormone in patients presenting with subclinical hypothyroidism (in Russian). Vopr Kurortol Fizioter Lech Fiz Kult 2011;(5):29-33. Available from: https://pubmed.ncbi.nlm.nih.gov/22165143/. [Last accessed on 2024 Oct 07].

47. 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(5):456-66. doi: 10.1016/j.explore.2007.06.001

48. Nielsen A. Gua sha research and the language of integrative medicine. J Bodyw Mov Ther 2009;13(1):63-72. doi: 10.1016/j.jbmt.2008.04.045

49. Dubinskaya AD, Yurova OV, Rogatkin DA, Glazkova PA, Glazkov AA, Krasulina KA, et al. The influence of Gua Sha massage on microcirculation indicators (in Russian). Bulletin of Rehabilitation Medicine 2023;22(2):112-9. doi: 10.38025/2078-1962-2023-22-2-112-119

50. Dubinskaya AD. Age OFF: Wipe the Age off Your Face (in Russian). Moscow: Eksmo, 2021.

51. Lee MS, Choi TY, Kim JI, Choi SM. Using Guasha to treat musculoskeletal pain: a systematic review of controlled clinical trials. Chinese Medicine 2010;5:5. doi: 10.1186/1749-8546-5-5

52. Aprile A, Pomara C, Turillazzi E. Gua Sha a traditional Chinese healing technique that could mimick physical abuse: a potential issue with forensic implications. A case study. Forensic Sci Int 2015;249:e19-e20. doi: 10.1016/j.forsciint.2015.02.015

53. Tsai KK, Wang CH. Acute epiglottitis following traditional Chinese gua sha therapy. CMAJ 2014;186(8):E298. doi: 10.1503/cmaj.130919

54. Yang G, Tan C. Lichen Planus Pigmentosus-like Reaction to Guasha. J Cutan Med Surg 2016;20(6):586-588. doi: 10.1177/1203475416659857

Figure legends:

Figure 1. A clinical study of 15 apparently healthy women aged 43 to 50 was conducted. At stage one, each woman received a Gua Sha massage for five minutes using a jade scraper in their forehead areas.

Figure 2. At stage two, blood flow velocity was measured using an optical signal on skin surface (incoherent optical fluctuation flowmetry method). Perfusion increased on average 1.85 times immediately after the procedure, compared to the baseline perfusion level before the massage.

Figure 3. At stage three, tissue perfusion studies were performed every five minutes for an hour. The obtained results exhibited a significant increase in blood flow velocity in the massaged area and long-term preservation of tissue perfusion after the massage.