

Effect of Yogic Breathing Techniques on Trigeminal Nerve-Mediated Pain Pathways.

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Abstract:

Background: Trigeminal nerve-mediated pain disorders, including trigeminal neuralgia and migraine, significantly impair quality of life. Yogic breathing techniques (Pranayama) have gained attention as complementary therapies for pain management through their effects on neural and autonomic regulation. **Objective:** To review the potential effects of yogic breathing techniques on trigeminal nerve-mediated pain pathways. **Methods:** A literature review was conducted using electronic databases such as PubMed, Scopus, Google Scholar, and ResearchGate. Relevant studies evaluating the effects of pranayama on pain modulation, autonomic function, and neural mechanisms were included. **Results:** Evidence suggests that yogic breathing techniques enhance parasympathetic activity, reduce sympathetic overactivity, decrease stress-related responses, and modulate central pain processing. Practices such as Nadi

Shodhana, Bhramari, and Ujjayi Pranayama have demonstrated beneficial effects on pain perception and psychological well-being. **Conclusion:** Yogic breathing techniques may serve as safe and effective adjunctive interventions for trigeminal nerve-mediated pain

Keywords: Trigeminal nerve, *Pranayama*, Trigeminal neuralgia, Neuropathic pain, Yoga, Pain modulation

Introduction :

The trigeminal nerve is the largest cranial nerve and plays a crucial role in facial sensation and motor functions such as mastication. Trigeminal neuralgia (TN) is a chronic pain condition characterized by sudden, unilateral, severe facial pain episodes, often triggered by minimal stimuli such as touch or speaking.

The most common etiology involves neurovascular compression at the root entry zone, leading to demyelination and aberrant

nerve conduction. Despite advancements in pharmacological therapies like carbamazepine and surgical interventions, many patients experience incomplete relief or adverse effects.

In recent years, integrative approaches such as *pranayama* have gained attention due to their influence on autonomic regulation and central nervous system activity. These practices are believed to modulate pain pathways and improve overall neurophysiological balance.

Aim and Objectives

Aim

To review the effect of *yogic* breathing techniques on trigeminal nerve-mediated pain pathways.

Objectives

To describe the anatomical and physiological basis of trigeminal nerve pain

To analyze mechanisms of pain modulation through *pranayama*

To evaluate existing evidence supporting *yoga* in trigeminal neuralgia.

Materials and Methods

This review article was conducted through a comprehensive search of published scientific literature on the effects of *yogic* breathing techniques on trigeminal nerve-mediated pain pathways. Relevant articles were identified from electronic databases including PubMed, Google Scholar, Scopus, Science Direct, and Research Gate. The literature search was performed using keywords such as “*Yogic* Breathing,” “*Pranayama*,” “Trigeminal Nerve,” “Trigeminal Neuralgia,” “Neuropathic Pain,” “Pain Modulation,” “Autonomic

Nervous System,” “*Bhramari Pranayama*,” “*Nadi Shodhana*,” and “*Ujjayi Pranayama*.”

Articles published in English from 2000 to 2025 were considered. Original research articles, clinical trials, review articles, and experimental studies evaluating the neurophysiological effects of *yogic* breathing practices on pain perception, autonomic regulation, and neural function were included. Studies unrelated to trigeminal nerve function, pain mechanisms, or *yogic* breathing interventions were excluded.

Relevant data regarding study design, breathing techniques employed, proposed mechanisms of action, and therapeutic outcomes were extracted, analyzed, and synthesized descriptively to assess the potential role of *yogic* breathing techniques in the management of trigeminal nerve-mediated pain.

Anatomy of Trigeminal Nerve:

The trigeminal nerve arises from the Pons and divides into three major branches:

Ophthalmic nerve (V1) – purely sensory

Maxillary nerve (V2) – purely sensory

Mandible nerve (V3) – mixed (sensory and motor)

Sensory fibers transmit impulses from the face to the trigeminal ganglion and further to the brainstem nuclei, including the spinal trigeminal nucleus, which plays a key role in nociception. These signals are then relayed to higher centers such as the thalamus and cerebral cortex for pain perception.

Pathophysiology of Trigeminal Neuralgia :

Trigeminal neuralgia results from multiple pathological mechanisms, including:

- I. Neurovascular compression
- II. Focal demyelination
- III. Central sensitization

These changes lead to hyper excitability of trigeminal neurons and abnormal empathic transmission. As a result, even non-painful stimuli may trigger intense pain episodes. Central mechanisms further amplify pain perception through altered processing in the thalamus and cortical areas.

Yogic Breathing Techniques (Pranayama)

Pranayama refers to controlled regulation of breath and includes techniques such as:

Anulom Vilom (alternate nostril breathing)

Bhramari (humming bee breathing)

Ujjayi breathing

Slow diaphragmatic breathing:

These techniques influence respiratory rhythm, autonomic balance, and neural activity.

Mechanism of Action on Pain Pathways:

1. Autonomic Nervous System Modulation

Pranayama enhances parasympathetic dominance and reduces sympathetic over activity. This shift leads to relaxation, reduced stress response, and decreased pain perception.

2. Vagal Stimulation and Neuromodulation

Controlled breathing stimulates the vagus nerve, which modulates limbic system activity and reduces nociceptive signaling. This contributes to improved emotional regulation and pain control.

3. Central Pain Modulation

Yogic breathing influences key brain regions involved in pain processing, including:

- ✓ Thalamus
- ✓ Cerebral cortex
- ✓ Limbic system

This results in reduced central sensitization and increased pain threshold.

4. Psychological Modulation

Pranayama reduces stress, anxiety, and depression factors known to exacerbate chronic pain conditions thereby indirectly improving pain outcomes.

Evidence from Studies

Several studies support the role of *yoga* and *pranayama* in neuropathic pain management:

A systematic review by Rebecca L. Acabchuk et al. demonstrated that *yoga* significantly reduces pain intensity and improves quality of life in neuropathic conditions.

Neurophysiological studies indicate that *pranayama* enhances autonomic balance and brain function, contributing to pain modulation.

Case-based evidence suggests beneficial outcomes of *yoga*-based interventions in trigeminal neuralgia without invasive procedures.

Although evidence is promising, further large-scale randomized controlled trials are required for validation.

Discussion

Yogic breathing techniques offer a holistic and integrative approach to managing trigeminal nerve-mediated pain. Unlike

conventional treatments that primarily target symptoms, *pranayama* addresses both physiological and psychological components of pain.

From an anatomical perspective, the modulation of trigeminal pathways through autonomic regulation and central neuromodulation explains the therapeutic effects. Vagal stimulation and neuroplasticity further support the role of *pranayama* in long-term pain management.

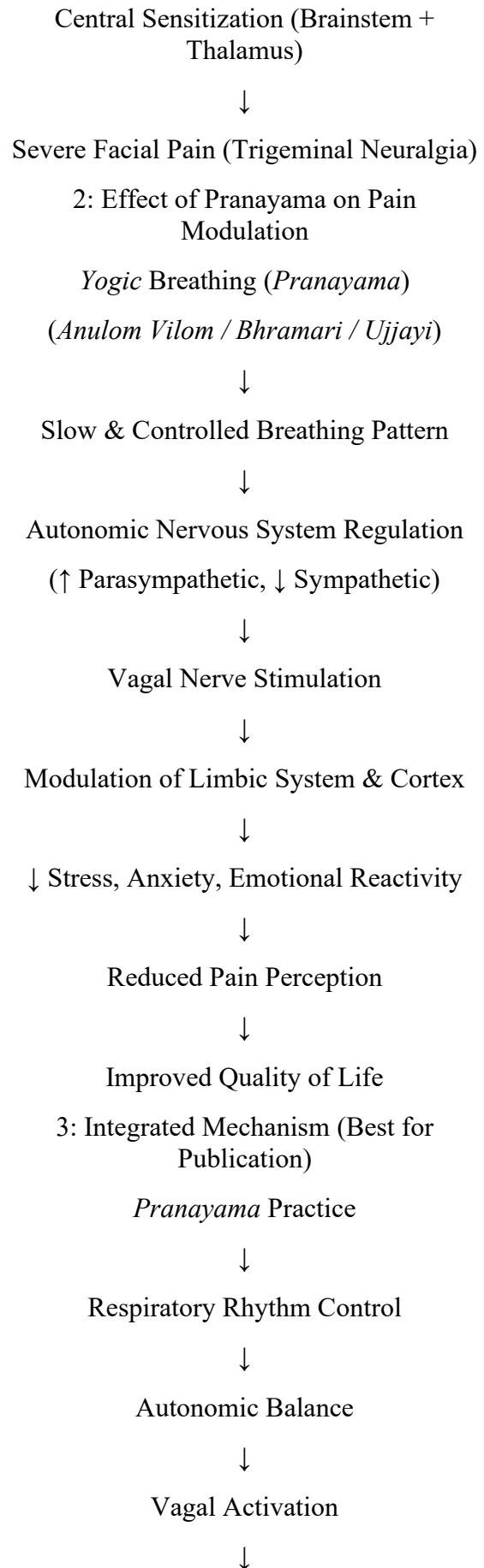
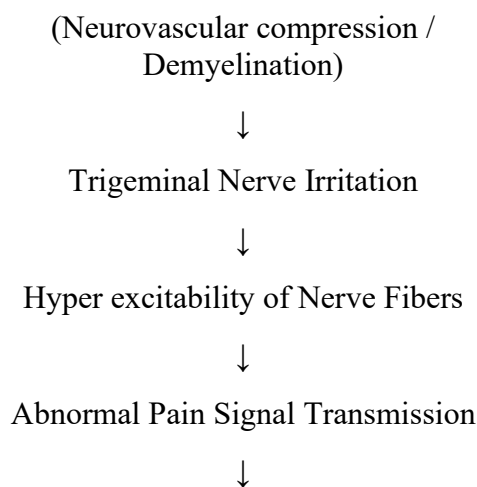
However, limitations include variability in study designs, small sample sizes, and lack of standardized protocols.

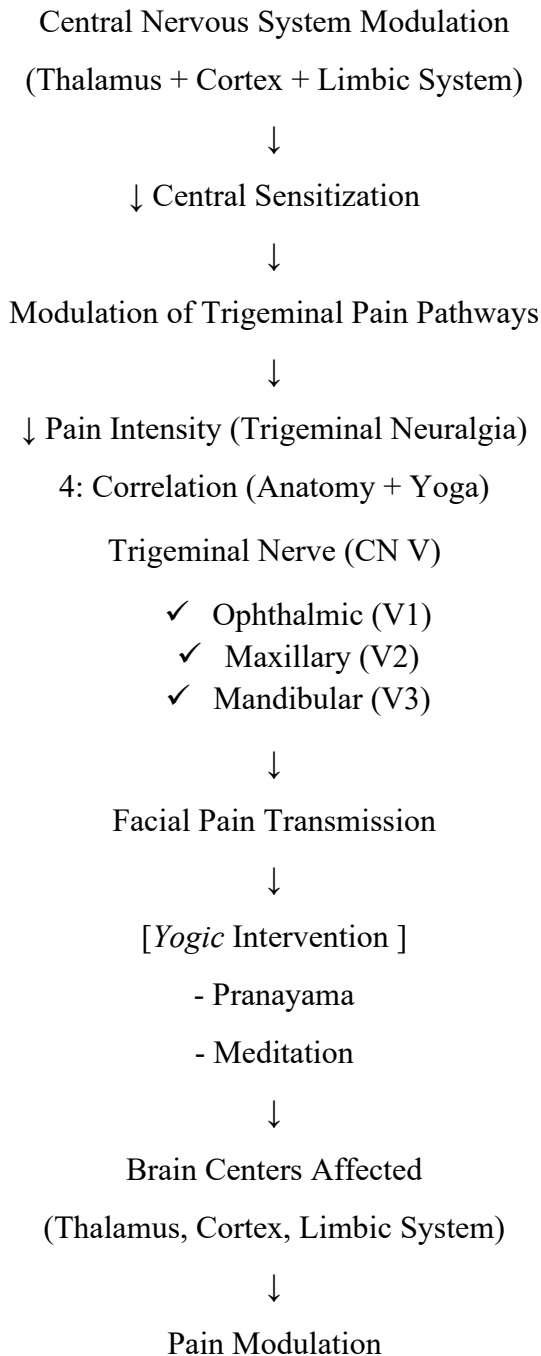
Conclusion

Yogic breathing techniques have significant potential in modulating trigeminal nerve-mediated pain pathways. Through autonomic regulation, vagal stimulation, and central neuromodulation, *pranayama* can reduce pain intensity and improve quality of life. It may be recommended as an effective adjunct therapy in the management of trigeminal neuralgia.

Flowchart 1: Trigeminal Neuralgia Pathway

Etiological Factors





References:

1. Acabchuk, Rebecca L., et al. "Yoga as a Complementary Therapy in Neuropathic Pain: A Systematic Review and Meta-Analysis." *Journal of Family Medicine and Primary Care*, vol. 12, no. 5, 2023, pp. 1023–1030.
2. Campanelli, Stephany, et al. "Pranayamas and Their

- Neurophysiological Effects." *International Journal of Yoga*, vol. 13, no. 3, 2020, pp. 183–192.
3. Brown, Richard P., and Patricia L. Gerbarg. "Sudarshan Kriya Yogic Breathing in the Treatment of Stress, Anxiety, and Depression." *Journal of Alternative and Complementary Medicine*, vol. 11, no. 2005, pp. 711–717.
4. Jerath, Ravinder, et al. "Physiology of Long Pranayamic Breathing: Neural Respiratory Elements May Provide a Mechanism That Explains How Slow Deep Breathing Shifts the Autonomic Nervous System." *Medical Hypotheses*, vol. 67, no. 3, 2006, pp. 566–571.
5. Nivethitha, L., et al. "Effect of Pranayama on Brain Function and Autonomic Nervous System." *Ancient Science of Life*, vol. 36, no. 2, 2016, pp. 67–73.
6. Bowsher, David. "Trigeminal Neuralgia: Pathophysiology and Treatment." *British Journal of Anaesthesia*, vol. 87, no. 1, 2001, pp. 117–122.
7. Love, S., and J. Coakham. "Trigeminal Neuralgia: Pathology and Pathogenesis." *Brain*, vol. 124, no. 12, 2001, pp. 2347–2360.
8. Zakrzewska, Joanna M., and Joanna Hamlyn. "Trigeminal Neuralgia." *BMJ Clinical Evidence*, 2014, pp. 1–20.
9. Hall, John E. *Guyton and Hall Textbook of Medical Physiology*. 14th ed., Elsevier, 2021.
10. Standring, Susan, editor. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 42nd ed., Elsevier, 2020.

11. Snell, Richard S. Clinical Neuroanatomy. 8th ed., Wolters Kluwer, 2019.
12. Tortora, Gerard J., and Bryan Derrickson. Principles of Anatomy and Physiology. 16th ed., Wiley, 2021.
13. Satyanarayana, U., and U. Chakrapani. Biochemistry. 5th ed., Elsevier, 2017.
14. Streeter, Chris C., et al. "Effects of Yoga on the Autonomic Nervous System." Medical Hypotheses, vol. 78, no. 5, 2012, pp. 571–579.
15. Telles, Shirley, et al. "Breathing through a Particular Nostril Can Alter Metabolism and Autonomic Activities." Indian Journal of Physiology and Pharmacology, vol. 38, no. 2, 1994, pp. 133–137.
16. Kharat, Aruna, et al. "Effect of Bhramari Pranayama on Stress and Cardiovascular Parameters." International Journal of Yoga, vol. 10, no. 2, 2017, pp. 89–95.
17. Innes, Kim E., and Terry Kit Selfe. "Yoga for Adults with Chronic Pain: A Systematic Review." Journal of Pain, vol. 17, no. 7, 2016, pp. 1–12.
18. De Silva, U. M. G. D., et al. "Effects of Ayurveda Interventions on Trigeminal Neuralgia." Journal of Ayurveda and Integrative Medicine, vol. 14, no. 3, 2023, pp. 100678.
19. Patanjali. Yoga Sutras of Patanjali. Translated by Swami Satchidananda, Integral Yoga Publications, 2012.
20. Swami Kunalayananda. Pranayama. Kaivalyadhama, 2013.

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