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Effects of Bhramari Pranayama on internet addiction-induced headaches: A narrative review

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Abstract
Internet Addiction (IA) is one of the important public health challenges worldwide, which i
nvolves overuse or excessive use of internet resulting in various physical and psychological symptoms including headache. It is a common problem, especially in adolescence and young adulthood, and studies have associated both prolonged screen time and problematic internet use with increased headache frequency and severity. These IA induced headaches are usually the result of digital eye strain, bad posture and muscle tension.

Considering the significant burden of IA and headache, effective interventions are clearly required. Bhramari Pranayama: a yogic practice of breathing with a humming sound during exhalation may be a potentially effective non-pharmacological intervention. This practice is also known for its calming and de-stressing effects, increasing parasympathetic activity (the body's "rest and digest" system), decreasing sympathetic dominance (the body's "fight or flight" part of the nervous system) and combatting stress- a leading trigger of headaches.

Clinical research also shows that Bhramari Pranayama decreases frequency, severity and duration of headaches, demonstrated by a decrease in headache impact scores and migraine disability scores and lessening of pain intensity in tension type of headache. It reduces the stress index and improves heart rate variability. Although there are few direct studies associating Bhramari Pranayama with Inducing AI-induced headache, its effectiveness in lowering the stress and general headaches provides its therapeutic importance. Additional investigations using standardized protocols and conducting multi-site randomized controlled trials are required to confirm these findings.

Keywords: Bhramari pranayama, internet addiction (ia), headaches, stress, yogic breathing, digital eyestrain, parasympathetic activity

Introduction

Internet Addiction (IA) is a growing global concern, characterized by "excessive or uncontrolled behavior related to Internet access, leading to impairment or distress, which disrupts users' daily lives" (León Méndez *et al*., 2024). Internet addiction has emerged as a significant public health issue, contributing to physical and psychological symptoms, including headaches (Radvanyi *et al*., 2024) [12]. Defined as "a maladaptive and excessive use of the Internet, characterized by frequent or uncontrollable use that interferes with important activities, tolerance, withdrawal symptoms, and adverse consequences on psychological well-being and social relationships" (Internet Addiction - an Overview | ScienceDirect Topics, 2018), IA shares features with substance-related addictions, such as tolerance, salience, withdrawal, and craving. Its prevalence is particularly high among adolescents and young adults, with a pooled prevalence in India reported at 58.34% for any level of IA, including 36.33% mild, 18.04% moderate, and 0.88% severe cases (Tadpatrikar *et al*., 2024). Studies indicate that 20% to 40% of Indian college students are at risk for IA (Joseph *et al*., 2021), with psychosocial factors like male gender, single-parent families, depression, stress, anxiety, and loneliness acting as significant correlates (Tadpatrikar *et al*., 2024).

The adverse effects of IA extend beyond psychological and social domains, manifesting in physical discomforts, including severe headaches. Research has linked IA to symptoms such as carpal tunnel syndrome, dry eyes, backaches, neck aches, sleep disturbances, and pronounced weight changes (Kumar & Mondal, 2018). Notably, IA has been associated with headaches, with studies reporting that 28.0% of adolescents experience headaches linked to excessive internet and mobile use, with females being overrepresented (Cerutti *et al*., 2016). A study in Madhya Pradesh, India, found that internet gaming addiction is significantly associated with poor sleep quality, with 65.1% of students experiencing mild to moderate sleep difficulties and headaches (Shakya *et al*., 2023). Furthermore, a study by Radvanyi *et al*. (2024a) reported that 20% of students had IA, with 63.1% suffering from migraines and 22.6% experiencing insomnia, highlighting that higher internet dependence correlates with greater headache impact and insomnia severity.

Cross-sectional studies provide further insights into the association between internet use and headache severity. A study among Hungarian university students found that problematic internet use and night-time internet use were significantly linked to the severity of tension-type headaches (TTH), but not migraines, with risk factors including age under 30, not having children, being married, spending over 4 hours daily online, mood disturbances, and insomnia (Radvanyi *et al*., 2024b). Similarly, a study among Bangladeshi students engaged in online education reported prevalences of 26.07% for migraine headaches (MH), 47.08% for TTH, and 14.75% for mixed headaches, with longer durations of online study and moderate-to-severe depression significantly associated with both headache types (S. Roy *et al*., 2024). Additionally, a prospective cohort study from the COSMOS study (N = 78,437) found that text messaging, rather than voice calling, was strongly associated with headaches, suggesting that behavioral factors linked to mobile phone use, rather than radiofrequency electromagnetic fields, may contribute to headache prevalence (Traini *et al*., 2024). Prolonged screen time and stress associated with excessive internet use are known triggers for tension-type headaches and migraines (Screen Headaches and Migraine, 2021) [15]. Bhramari Pranayama, a yogic breathing technique involving a humming sound during exhalation, is recognized for its calming effects on the autonomic nervous system (Chetry *et al*., 2024) [4].

Owing to the debilitating physical and psychological impact of IA, including the headache is a factor which further complicates it, there is an urgent requirement for consideration of interventions to reduce these impacts. The yogic pranayama technique Bhramari, which has calming and stress relieving effects, could be a potential modality to manage IA associated headache. This manuscript has been prepared to explore the impact of Bhramari Pranayama on severity of headache in individuals with IA, an area where there are currently few nonpharmacological interventions for what is fast becoming a significant public health issue. This review analyzes the promising value of Bhramari Pranayama as a non-pharmacological intervention in treating internet addiction-induced headaches, including its mechanisms, effectiveness and limitations according to existing studies.

Objective

To assess the efficacy and mechanisms of Bhramari Pranayama in managing internet addictioninduced headaches through a review of its effects on headache frequency, severity, stress, and autonomic function.

Methodology

This review synthesizes findings carried out till August 2025, sourced from databases such as PubMed, Scopus, and Google Scholar. Keywords included "Bhramari Pranayama," "headache," "internet addiction," and "stress." Studies were included if they investigated Bhramari Pranayama's effects on headaches, stress, or autonomic function. Exclusion criteria included non-English studies and those lacking empirical data. A narrative synthesis approach was used to analyze the findings due to the heterogeneity of study designs. Zotero, open-source reference management software was used to cite.

Internet addiction induced headache

Screen headaches are a type of headache that can occur due to extended time spent in front of electronic screens. They share some symptoms with typical headaches and migraine attacks but also include specific effects related to screen use. Pain behind the eyes, Eye-related symptoms, Eyestrain, Blurry vision, Dry eyes, Sensitivity to light, Tight neck and shoulder muscles. (Screen Headaches and Migraine, 2021) [15]

An internet addiction-induced headache is a headache caused or worsened by excessive time spent online, often associated with problematic internet use. This condition can arise from factors like digital eye strain from screens, poor posture from bending over devices ("text neck"), and other negative health impacts that stem from a compulsive need to be online. While the link between problematic internet use and headaches is still an area of active research, studies suggest a correlation between prolonged screen time and increased frequency and severity of headaches. (Radvanyi *et al*., 2024) [12]

Spending frequent time looking at digital screens can contribute to headache, which may interfere with daily life. Headaches, often involving throbbing pain in the head and requiring rest in a dark and quiet environment. One major cause is digital eyestrain, prolonged exposure to electronic screens and can lead to headache disorders. Digital eyestrain is often associated with eye fatigue from prolonged staring, poor background lighting, or maintaining an incorrect distance from the screen. In addition, poor posture while using screens may cause muscular tension in the neck and shoulders, which can further trigger headaches and migraines. (Migraine and Headaches, 2023) [9]

According to the American Optometric Society, just two hours of continuous screen time can cause digital eye strain, or computer vision syndrome. Factors like glare, reduced blinking, poor lighting, posture, and intense focus make it harder on the eyes. While not serious, eye strain can be uncomfortable and often leads to headaches. (Is Excess Screen Time Causing Your Headaches? 2020) [5]

Bhramari Pranayama

Yoga, derived from the Sanskrit word Yuj meaning "to unite," is the practice of harmonizing the body, mind, and soul. It is both a philosophy and discipline that promotes physical health, mental clarity, and spiritual growth through postures, breathing techniques, meditation, and ethical living. At its core, yoga is the path to balance, inner peace, and self-realization. (Asim Kulshreshtha, 2025) [2]

Yoga is an ancient Indian science that designs way of life with its various practices. It is being practiced in the form of Asana (Posture), Pranayama (breathing manipulation), Meditation (concentration technique) etc by the practitioners in range of methods and style. Pranayama is one practice that has been found to be effective to physiology of mankind in many ways. (Telles *et al*., 2007) [16]

The word 'prana' is a combination of two syllables pra and na and denotes constancy, being a force in constant motion. Whereas prana is the vital force, pranayama is the process by which the internal pranic store is increased. Some people split the word 'pranayama' into prana and yama and define it as 'breath control'. However, it is actually comprised of the word's prana and ayama which means 'pranic capacity or length'. (Swami Niranjanananda, 1998)

वेगाद् घोषं परं कृत्वा भ्रङ्ग-नादं बृङ्गी-नादं च रेचकं मन्द-मन्दम् ।
योगीन्द्राणमेवमभ्यास-योगाच्चित्ते जाता काचिदानन्द-लीला ॥

Breathe in quickly, making a reverberating sound like the male black bee, and exhale slowly while softly making the sound of the female black bee. Through this practice, the yogi attains supreme bliss and mastery over the mind. (Muktibodhananda, 2012, p. 65)

Similarly, the Gheranda Samhita describes the deeper meditative aspects of Bhramari

अर्धरात्रे गते योगी जन्तनां
शब्दवच्चाधते। कणि स्पर्शे
हस्ताभ्यां कुञ्जरधातुरककुम्भकम्॥

ध्वनेरन्तर्गतं
ज्योतिज्योतिरन्तर्गतं मनः।
तन्मनो चलयन् याचत् तच्चित्स्नोः परमं पदम्।
एवं भ्रामरीसंचारः समाचर्य समाप्नयात्॥

At midnight, in a silent place, the yogi should close the ears with the hands, inhale, and retain the breath. In its resonance, the inner light manifests, and the mind dissolves into divine consciousness. Perfecting this leads to samadhi. (Saraswati, 2012, p. 326)

These descriptions highlight not only the technical aspects of Bhramari (such as the sound vibrations produced during inhalation and exhalation) but also its profound meditative potential, as affirmed in traditional scriptures.

So Bhramari Pranayama technique is not only a breathing practice but also a form of meditation. As compared with other pranayama, it does not have any kind of breath holding or alternate nostril involvement with counting. Added to above, the humming sound which is produced during the breathing gives more attraction and interest to the subjects for practicing the pranayama. In this, it's very convenient to control and check the correctness by the sound of humming which is produced by the pranayama practitioners. (Kuppusamy *et al*., 2018) [8] Practice of Bhramari Pranayama for 5–10 min continuously induces subjective feelings of mind refreshment and blissfulness and sometimes the subjects are believed to go to even meditative state.(Rajkishor *et al*., 2006) [13]

Bhramari Pranayama and Its Effects on Internet Addiction induced Headache

Bhramari Pranayama is a yogic breathing technique where one inhales through both nostrils and produces a humming sound like a bee during exhalation. Bhramari Pranayama promotes relaxation by enhancing parasympathetic activity and reducing sympathetic dominance, which mitigates stress, a key trigger for headaches (Chetry *et al*., 2024; Nivethitha *et al*., 2016) [4, 10] The humming sound during exhalation increases nitric oxide production in nasal sinuses, which may have anti-inflammatory effects.(G. Y. Trivedi & Saboo, 2021) [18] Additionally, Bhramari Pranayama lowers blood pressure and heart rate, potentially alleviating hypertension-related headaches (Upadhyay *et al*., 2023) [19]. Acoustic analyses indicate that the technique involves a larger pharyngeal cavity and narrower velar passage, contributing to a relaxed articulatory posture (Prakash *et al*., 2022) [11]. EEG studies reveal that Bhramari Pranayama modulates theta and gamma wave activity, associated with relaxation, memory processing, and cognitive clarity also induces subjective feelings of mind refreshment and blissfulness, and has been claimed to reduce hormonal imbalances and have a calming effect (Bhatia, 2023; Roy, 2023; Vialatte *et al*., 2009) [3, 14, 20].

Clinical studies demonstrate that Bhramari Pranayama reduces headache frequency, severity, and duration. A randomized controlled trial reported significant improvements in Headache Impact Test-6 (HIT-6) and Migraine Disability Assessment (MIDAS) scores among migraine patients practicing Bhramari Pranayama alongside standard treatment (Kaushal *et al*., 2023) [7]. Similar benefits were observed for tension-type headaches, with yoga interventions incorporating Bhramari Pranayama reducing pain intensity (Anheyer *et al*., 2020) [1]. A pilot study found that Bhramari Pranayama lowered the stress index and enhanced heart rate variability (HRV), suggesting its role in stress-related headache management (G. Trivedi *et al*., n.d.).

Internet addiction is associated with prolonged screen exposure, leading to stress and tensiontype headaches. Bhramari Pranayama's stress-reducing effects may mitigate these symptoms by improving mental health outcomes, including reduced anxiety and depression (Jagadeesan *et al*., 2022) [6]. However, direct studies linking Bhramari Pranayama to internet addictioninduced headaches are limited, necessitating extrapolation from its effects on stress and headaches in general.

Bhramari Pranayama shows promise as an adjunctive therapy for headaches, particularly those triggered by stress from internet addiction. Its ability to enhance parasympathetic activity, reduce blood pressure, and modulate brain wave activity supports its therapeutic potential (Nivethitha *et al*., 2016; Roy, 2023) [10, 14]. However, evidence for migraines is less consistent, with yoga interventions being more effective for tension-type headaches (Anheyer *et al*., 2020) [1]. The lack of studies specifically addressing internet addiction-induced headaches highlights a research gap. Limitations include small sample sizes, varying intervention durations, and the need for multi-site randomized controlled trials to confirm findings (Jagadeesan *et al*., 2022) [6]. Future research should explore standardized protocols and long-term effects.

Conclusion

Bhramari Pranayama appears to be a promising complementary therapy for headaches, especially those triggered by stress from internet addiction, due to its ability to boost parasympathetic activity, lower blood pressure, and influence brain wave patterns. Although there are limited direct studies connecting Bhramari Pranayama to headaches caused by internet addiction, it is necessary to draw conclusions from its overall effects on stress and headaches. The current evidence points to its potential benefits in therapy. Future studies should prioritize standardized methods and long-term impacts through multi-center randomized controlled trials to validate these observations. Bhramari Pranayama provides a low-cost, noninvasive method for managing headaches that may result from internet addiction. Its mechanisms, such as reducing stress and modulating autonomic activity, highlight its role as a valuable adjunct therapy. Despite encouraging preliminary results, additional research is required to determine its effectiveness and the best protocols for this particular population.

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