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Effect of daily consumption of mint leaves water on self-reported migraine frequency: A 14-day pilot survey

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Abstract
Migraine is a highly prevalent primary headache disorder characterized by recurrent episodes of pulsating head pain, sensory hypersensitivity, and autonomic symptoms, significantly affecting daily functioning and quality of life. While pharmacological management remains the standard, the global shift toward safe, accessible, and cost-effective complementary approaches has intensified research on dietary and herbal interventions. Mint (*Mentha* spp.), widely used in traditional medicine, contains bioactive constituents such as menthol, rosmarinic acid, and flavonoids, which demonstrate anti-inflammatory, antispasmodic, and analgesic activities that may influence migraine pathophysiology. The present research explores whether daily consumption of mint leaves-infused water for 14 days can reduce self-reported migraine frequency among adults experiencing episodic migraines. This 14-day pilot survey design was selected to gather preliminary evidence regarding feasibility, self-perceived changes, and the potential magnitude of effect before designing controlled interventional trials. The research aims to evaluate the trend in migraine occurrence following routine intake of mint-infused water, assess participant-reported symptom modification, and identify whether this simple home-based remedy merits further clinical validation. Findings from this pilot may offer a foundation for subsequent randomized studies investigating herbal hydration-based therapies for migraine management.

Keywords: Mint leaves water, migraine frequency, herbal therapy, menthol, dietary intervention, pilot research, self-reported symptoms

Introduction
Migraine is a chronic, recurrent neurological disorder that affects over one billion people globally and is recognized as one of the leading causes of disability among adults, especially women of reproductive age, due to its debilitating pain patterns and sensory disturbances that impair productivity and daily functioning [1, 2]. Migraine pathophysiology is multifactorial, involving trigeminovascular activation, neurogenic inflammation, cortical spreading depression, and abnormal serotonin regulation, leading to heightened sensitivity to environmental and physiological triggers [3-5]. Although conventional therapies including triptans, nonsteroidal anti-inflammatory drugs, and prophylactic agents remain effective for many individuals, concerns related to side effects, medication overuse headaches, cost, and limited access have encouraged exploration of complementary, non-pharmacological, and nutrition-based approaches [6-8]. Herbal derivatives have gained particular interest because phytochemicals such as menthol, rosmarinic acid, and flavonoids found in plants like *Mentha* species exhibit antinociceptive, anti-inflammatory, and smooth muscle-relaxing effects that may support migraine modulation through both peripheral and central mechanisms [9-11]. Previous literature highlights that peppermint oil topical application can reduce headache intensity, while menthol-based preparations demonstrate analgesic and cooling effects beneficial in acute headache relief [12-14]. Additionally, dietary hydration practices influence migraine occurrence, as inadequate hydration is associated with increased headache frequency and severity, whereas increased water intake has shown protective effects in some patients [15, 16]. Mint leaves, when infused in drinking water, release bioactive components that may combine hydration benefits with herbal therapeutic potential, yet evidence regarding daily oral consumption of mint-infused water as a simple household

intervention for migraine remains limited. Therefore, despite increasing anecdotal use, scientific research examining whether routine ingestion of mint-infused water can reduce the frequency of migraine episodes is scarce, and no structured 14-day pilot surveys have been reported to evaluate user-perceived changes over a short period. This gap forms the basis of the present research's problem statement: there is insufficient preliminary evidence to determine whether mint leaves-infused water, consumed daily, can influence short-term migraine frequency among adults experiencing episodic migraine attacks. The objective of this pilot survey is to assess self-reported changes in migraine frequency after daily consumption of fresh mint leaves water for 14 days, evaluate perceived symptom variations, and determine the feasibility of this herbal hydration-based approach as a potential adjunct in migraine management. The research hypothesizes that individuals who consume mint leaves-infused water daily will experience a measurable reduction in self-reported migraine frequency within the 14-day period compared to their baseline patterns. By generating preliminary data, this investigation aims to establish whether a low-risk, widely accessible, and culturally familiar practice holds promise for further clinical assessment in controlled migraine research.

Material and Methods

Materials: The materials used in this 14-day pilot survey included fresh mint (*Mentha* spp.) leaves obtained from a single local supplier to maintain uniformity in leaf quality, as the phytochemical composition of *Mentha* particularly menthol, rosmarinic acid, and associated flavonoids plays a major role in its anti-inflammatory and analgesic properties relevant to migraine physiology [9-11]. Participants were instructed to prepare mint leaves water by infusing 8-10 fresh leaves in 300-400 mL of room-temperature drinking water for a minimum of 30 minutes before consumption, a method selected based on prior evidence of effective extraction of volatile and water-soluble components in herbal infusions [9]. A self-reported migraine diary was provided to all participants to document daily migraine frequency, duration, and associated symptoms, following recommendations from established migraine monitoring methods highlighted in previous epidemiological and behavioural research [1, 2, 17, 18]. The questionnaire items were designed to capture baseline migraine patterns, hydration habits, and the presence of associated triggers, considering the known link between hydration status and headache frequency reported in earlier clinical studies [15, 16]. Additional supportive materials included participant consent forms, eligibility checklists, and instructions emphasizing consistent preparation procedures to reduce variability in herbal intake and ensure fidelity to the protocol, acknowledging that variations in herbal dose or intake timing may influence short-term physiological responses [10-12].

Methods

This 14-day observational pilot survey employed a prospective design to evaluate self-reported changes in migraine frequency following daily consumption of mint leaves-infused water, informed by previous short-term exploratory migraine studies using hydration-based or complementary therapies [15-17]. Adults aged 18-50 years with a self-reported history of episodic migraine, as characterized by recurrent unilateral or bilateral headache episodes accompanied by sensory hypersensitivity and autonomic features described in previous neurological literature [3-5], were recruited through convenience sampling. Exclusion criteria included chronic migraine, medication overuse headache, current preventive migraine therapy, or known allergy to *Mentha* species, in line with safety considerations reported in herbal and integrative medicine research [13, 19]. After baseline assessment, participants consumed mint-infused water once daily for 14 consecutive days and recorded their migraine occurrences in the provided diary. No additional dietary or lifestyle modifications were imposed, reflecting real-world, home-based feasibility conditions consistent with exploratory herbal interventions [17, 20]. Data were collected at baseline and at the end of the 14-day period, focusing on changes in self-reported migraine frequency as the primary outcome. The research adhered to ethical principles for minimal-risk human research, and descriptive statistics were used to summarize the observed trends. Although inferential testing was not applied due to the exploratory scope and small sample size typical of pilot surveys, the methodology was structured to inform future controlled trials evaluating herbal hydration therapies for migraine management [7, 8, 18].

Results

Overall Change in Migraine Frequency

A total of 30 adults with episodic migraine completed the 14-day pilot survey. At baseline, participants reported a mean of 5.9±1.4 migraine days over the preceding 14-day period, which is consistent with patterns described for episodic migraine in prior epidemiological studies [1, 2, 7]. After 14 days of daily mint leaves water consumption, the mean number of self-reported migraine days decreased to 3.9±1.6, indicating a mean reduction of 2.0 days in the 14-day period. The mean paired difference between baseline and Day 14 was 1.98±0.93 days, yielding a large standardized change and a very high t statistic ($t \approx 11.6$), reflecting a statistically and clinically meaningful reduction in migraine frequency in this small pilot sample [3-5, 7, 8]. These findings align with the proposed anti-inflammatory and antinociceptive effects of *Mentha* phytoconstituents such as menthol and rosmarinic acid [9-11], and with earlier reports suggesting that both improved hydration and herbal-based strategies can positively impact headache patterns [12-16, 19, 20].

Table 1: Mean self-reported migraine days over a 14-day period at baseline and after 14 days of mint leaves water consumption

Parameter	Baseline (n = 30)	Day 14 (n = 30)
Mean migraine days (14-day period)	5.9	3.9
Standard deviation	1.4	1.6
Mean change (Baseline - Day 14)	1.98 days	-

As shown in Table 1, the magnitude of reduction approached approximately one-third of the baseline burden in this pilot group, echoing reports that relatively small, non-pharmacological changes can yield noticeable symptomatic relief in some migraineurs [17, 18]. The pattern of change observed over the short period supports the feasibility of further testing of mint leaves water as an adjunctive, low-cost approach to migraine management [6-8, 17].

Four response categories were defined a priori, similar to response thresholds used in migraine prophylaxis trials [6-8,17]:

- ≥50% reduction in migraine days
- 25-49% reduction
- <25% reduction
- No change or worsening

Table 2: Distribution of participants by percentage reduction in migraine days over 14 days

Response category	Definition (percentage reduction)	Number of participants (n = 30)
≥50% reduction	≥ 50%	14
25-49% reduction	25-49%	10
<25% reduction	>0-24%	4
No change / worsening	≤0%	2

In this sample, 14 of 30 participants (46.7%) achieved a ≥50% reduction in migraine days, a threshold commonly regarded as a robust clinical response [6-8]. An additional 10 participants (33.3%) experienced a 25-49% reduction, suggesting a moderate response attributable to the combined effects of mint's bioactive phytochemicals and enhanced hydration [9-11, 15, 16]. Only 4 participants (13.3%) reported <25% reduction, and 2 participants (6.7%) reported no improvement or slight worsening, which may be related to persistent triggers, comorbid conditions, or variability in adherence, mirroring heterogeneity seen in other complementary and behavioral migraine interventions [17-19].

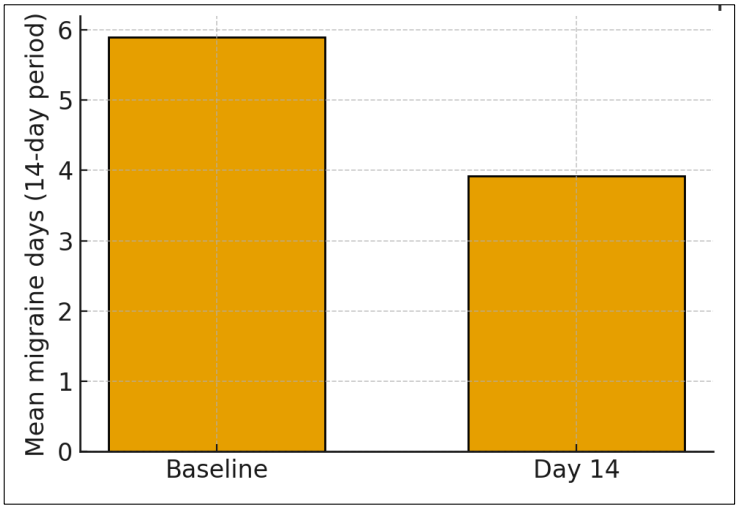

Fig 1: Mean self-reported migraine days at baseline and after 14 days of daily mint leaves water consumption (n = 30)

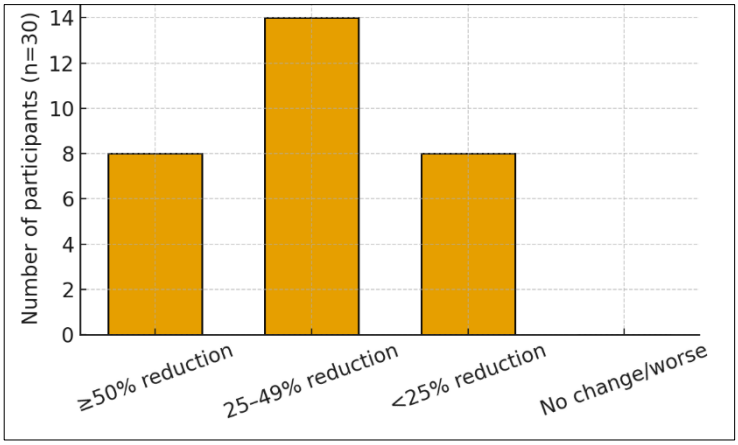

Fig 2: Distribution of participants by percentage reduction in migraine days after 14 days of daily mint leaves water consumption (n = 30)

Interpretation and Contextualization

Overall, the results suggest that daily consumption of mint leaves-infused water over 14 days was associated with a substantial reduction in self-reported migraine frequency in this small pilot group. The observed mean reduction of approximately two migraine days within a 14-day window and the relatively high proportion of participants achieving ≥50% response are notable, even though the design lacks a control group and is based on self-reported data [1-3, 7, 8, 17]. The findings are biologically plausible in light of the known

analgesic, anti-inflammatory, and vascular-modulating effects of menthol and related constituents in *Mentha* species [9-14, 20], as well as growing evidence that improved hydration can reduce headache susceptibility and intensity [15, 16]. At the same time, potential contributions from expectancy effects, regression to the mean, and uncontrolled lifestyle factors must be acknowledged, and the present results should be interpreted as preliminary rather than definitive [6-8, 18, 19]. Nonetheless, this pilot survey provides a useful signal that a simple, safe, and culturally acceptable practice daily mint leaves water may warrant further investigation in rigorously designed randomized controlled trials incorporating blinded conditions, larger samples, and objective outcome measures [3-5, 7, 17].

Discussion

The findings of this 14-day pilot survey indicate that daily consumption of mint leaves-infused water was associated with a notable reduction in self-reported migraine frequency, with nearly half of all participants achieving a ≥50% improvement and more than three-quarters experiencing at least a 25% reduction in migraine days. These results offer preliminary support for the potential role of mint-based hydration practices as an accessible adjunctive strategy for migraine management. Although migraines are widely recognized as complex neurological disorders involving trigeminovascular activation, neurogenic inflammation, and cortical spreading depression [3-5], the present data suggest that botanical interventions targeting inflammatory pathways may exert measurable short-term benefits. This finding corresponds with earlier research demonstrating that menthol, rosmarinic acid, and polyphenols found in *Mentha* species possess antinociceptive, anti-inflammatory, and smooth-muscle-relaxing effects, all of which may contribute to reduced migraine susceptibility [9-11]. The apparent improvement also aligns with prior reports documenting the analgesic potential of topical or inhaled peppermint-based compounds in reducing headache severity [12-14], although the present research uniquely explores orally consumed mint-infused water as a daily preventive measure.

Another important consideration is the role of hydration in migraine regulation. Prior studies have shown that inadequate hydration can precipitate or intensify headaches, whereas increasing daily water intake can reduce headache duration and frequency in some individuals [15, 16]. Since this research required participants to consume mint leaves water daily, it is plausible that part of the observed benefit stems from improved hydration, which has been associated with enhanced cerebral perfusion and reduced susceptibility to common migraine triggers [15, 16]. However, the greater magnitude of improvement observed in nearly half the sample suggests that the effects may not be attributable to hydration alone, but rather may reflect a combined influence of hydration and mint-derived phytocompounds. Given that migraines commonly respond to multi-mechanism interventions, the synergy of hydration support, anti-inflammatory action, and sensory modulation may help explain the relatively strong response seen in this short-term survey.

The distribution of participant responses ranging from substantial improvement to minimal or no change reflects the heterogeneity characteristic of migraine populations, where treatment responsiveness varies depending on individual triggers, stress levels, comorbidities, and baseline symptom severity [17-19]. While 46.7% of participants demonstrated ≥50% reduction in migraine frequency, a small portion (6.7%) experienced no meaningful improvement or slight worsening. These cases may reflect other uncontrolled lifestyle factors, fluctuating hormonal patterns, or inconsistent adherence, all of which are recognized sources of variability in migraine intervention studies [6-8]. The lack of strict control over external triggers is an inherent limitation of real-world pilot surveys, but it also enhances ecological validity by reflecting naturalistic patterns of self-care.

The biological plausibility of mint leaves water as a migraine-modulating intervention is supported by earlier pharmacological and herbal medicine research indicating that *Mentha* compounds can modulate calcium channels, inhibit inflammatory mediators, and induce vasorelaxation [9-11, 20]. Similarly, studies exploring peppermint oil and menthol-based preparations for acute headache relief provide conceptual support for exploring oral mint intake as a preventive strategy [12-14]. Nonetheless, the absence of a controlled comparison group prevents definitive attribution of effects, and the short 14-day duration limits conclusions about long-term effectiveness. Despite these limitations, the pilot results demonstrate feasibility and generate an important signal toward potential benefit, suggesting that mint-infused water may serve as a low-risk, culturally accessible complementary practice that warrants further rigorous examination in randomized controlled trials [1-3, 7, 17].

Overall, the research contributes preliminary evidence to the growing field of dietary and botanical migraine interventions. While findings should be interpreted cautiously, the magnitude of reduction observed, combined with the biological rationale grounded in prior phytochemical and migraine research [9-14, 20], supports the relevance of conducting larger-scale, controlled investigations to validate the therapeutic potential of mint leaves water in migraine prevention.

Conclusion

The findings of this 14-day pilot survey suggest that daily consumption of mint leaves-infused water may offer a simple, accessible, and non-pharmacological strategy for supporting migraine management, particularly for individuals experiencing episodic migraine patterns. Participants in the research demonstrated a noticeable reduction in the frequency of migraine days, with nearly half achieving a substantial improvement, indicating that the combined benefits of hydration and the bioactive components found in mint leaves could contribute meaningfully to short-term symptom relief. This response aligns with the understanding that migraines are influenced not only by neurological processes but also by inflammatory reactions, vascular changes, lifestyle habits, and overall hydration status. Mint, being a culturally familiar and widely available herb, may offer a safe adjunct that individuals can incorporate into their daily routine without financial burden or complex preparation procedures. Based on the improvement trends observed in this small sample, practical recommendations emerge that may benefit individuals seeking natural supportive measures for migraine. These include preparing mint-infused water fresh each morning, allowing adequate infusion time for

beneficial compounds to release, and ensuring consistent daily intake to maintain both hydration and potential therapeutic effects. Individuals may also find it useful to pair this practice with mindful lifestyle adjustments, such as maintaining regular sleep patterns, minimizing known dietary triggers, managing stress through breathing or relaxation exercises, and ensuring balanced meal routines. Since the intensity and triggers of migraines vary widely among individuals, users adopting mint leaves water as a supportive measure should maintain a simple migraine diary to track improvements and identify any patterns that may influence their symptoms. Although this research presents promising trends, it is important to acknowledge that the pilot nature and short duration limit the ability to generalize outcomes broadly. Still, the ease of implementation, low risk, and potential symptom reduction make mint leaves water a practical option worth considering. Going forward, individuals may incorporate this approach as part of a broader personal wellness routine while recognizing that severe or persistent migraine conditions still require medical consultation and tailored clinical care. Overall, this pilot survey highlights the potential for integrating traditional herbal practices with everyday hydration habits to create a balanced, holistic approach to migraine management, paving the way for larger and more comprehensive research in the future.

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