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Comparative research of clove water infusion vs. ginger water infusion for mild digestive relief in healthy adults

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Abstract
Clove (*Syzygium aromaticum*) and ginger (*Zingiber officinale*) are among the most widely used culinary spices in traditional and contemporary digestive health practices. Both possess bioactive compounds such as eugenol in clove and gingerols in ginger known for their carminative, anti-inflammatory, and antioxidant properties. Emerging evidence suggests that water-based preparations of these botanicals may elicit mild digestive relief by reducing bloating, enhancing gastric motility, and supporting overall gastrointestinal function. However, there is limited comparative evidence evaluating the relative effectiveness of clove water infusion versus ginger water infusion specifically in healthy adults experiencing mild digestive discomfort. This research aims to bridge that gap by examining their acute effects on subjective digestive comfort, perceived abdominal lightness, and reduction in post-meal bloating, using standardized infusion protocols. The background literature demonstrates that both clove and ginger have significant gastroprotective and pro-motility actions, yet no controlled comparative research has been reported. The present investigation hypothesizes that both infusions will provide measurable mild digestive relief, with ginger water infusion potentially demonstrating slightly superior improvement due to its well-documented pro-kinetic activity. The findings of this research may provide evidence-based guidance for simple, accessible, and non-pharmacological digestive support options for the general population.

Keywords: Clove water infusion, ginger water infusion, digestive health, gastro protection, gastric motility, mild digestive discomfort, herbal beverages, functional foods

Introduction
Herbal beverages and spice-based infusions have long played an integral role in traditional digestive health management, with clove (*Syzygium aromaticum*) and ginger (*Zingiber officinale*) recognized as two of the most commonly used botanicals for alleviating mild gastrointestinal discomfort. Clove contains eugenol, a phenolic compound with documented carminative, antimicrobial, and anti-inflammatory actions that may support gastrointestinal function by reducing spasms and neutralizing excessive gas formation [1-3]. Ginger, in contrast, is rich in gingerols and shogaols, compounds known to modulate gastric motility, accelerate gastric emptying, and reduce nausea or functional dyspepsia symptoms [4-6]. Although both spices have been widely studied for individual gastroprotective benefits, little scientific attention has been directed toward evaluating the comparative digestive effects of their simple water infusions, despite their common use in household remedies.

Digestive discomfort such as mild bloating, abdominal heaviness, and slower post-meal motility is frequently reported among otherwise healthy adults, often resulting from dietary habits, stress, or transient digestive inefficiencies. These symptoms, while not clinically severe, can affect daily comfort and perceived well-being. Non-pharmacological interventions like herbal water infusions are increasingly preferred due to ease of preparation, safety profile, and cultural familiarity. Research indicates that clove possesses antispasmodic and gastroprotective actions potentially beneficial in reducing mild digestive distress [7, 8]. Meanwhile, ginger has a well-established evidence base supporting its motility-enhancing and anti-dyspeptic properties, making it a promising candidate for mild digestive relief [9-11]. Yet, the absence of direct comparative data on clove versus ginger water infusions represents a meaningful research gap.

Considering this context, the present research formulates a unified background, problem statement, and rationale: although both clove and ginger demonstrate mechanisms consistent with digestive relief, the comparative efficacy of their water infusions in healthy adults experiencing mild, non-clinical digestive discomfort remains scientifically unexplored. To address this gap, the primary objective of the research is to compare the short-term effects of clove water infusion and ginger water infusion on subjective digestive comfort following a standardized meal. Additional objectives include assessing changes in bloating, perceived abdominal relaxation, and overall digestive ease. The research hypothesizes that both clove and ginger infusions will lead to significant improvements in digestive comfort compared to baseline, but ginger water infusion may exhibit slightly more pronounced effects due to its stronger pro-kinetic activity documented in previous literature [12-15]. By generating evidence-based insights, this research aims to support simple, accessible, and natural digestive health strategies aligned with modern wellness preferences [16,17].

Material and Methods

Materials: This research utilized dried clove buds (Syzygium aromaticum) and fresh ginger rhizomes (Zingiber officinale), both chosen due to their documented bioactive profiles relevant to digestive modulation [1-4]. Clove buds were sourced from a certified herbal supplier, ensuring uniformity in eugenol-rich content as supported by phytochemical analyses in prior research [2, 7]. Fresh ginger rhizomes were procured from a regulated agricultural market and selected based on maturity and firmness, consistent with studies demonstrating optimal gingerol potency in mature roots [4-6]. The water infusions were prepared using standardized protocols adapted from previous herbal infusion research, ensuring uniform extraction of active constituents [12-14]. Distilled water was used for every preparation to prevent mineral interference. Each clove infusion consisted of 2 g of dried buds steeped in 200 mL of hot water at 90°C for 10 minutes, whereas the ginger infusion consisted of 5 g of freshly sliced ginger steeped in 200 mL of water at the same temperature and duration, reflecting commonly accepted preparation strengths cited in previous gastrointestinal studies [5, 11, 14]. All glassware, measuring cylinders, and steeping containers were sterilized before use to avoid cross-contamination. Participants consumed the infusion warm (approx. 45-50°C), consistent with established herbal beverage protocols [16, 17].

Methods: A randomized, controlled, two-arm comparative design was used to evaluate the effects of clove water infusion versus ginger water infusion on mild digestive discomfort among healthy adults. Participants aged 20-45 years with self-reported occasional digestive discomfort (non-clinical levels) were recruited after meeting inclusion criteria aligned with earlier gastrointestinal herbal intervention studies [9-11]. Individuals with chronic gastrointestinal disorders, current medication use affecting motility, or allergies to cloves or ginger were excluded. Following random allocation into the clove infusion group or the ginger infusion group, each participant consumed their assigned infusion immediately after a standardized test meal designed to induce mild postprandial fullness, in accordance with digestive assessment methodologies described in earlier research [10, 14]. Subjective digestive comfort was assessed using a 10-point Likert scale evaluating bloating reduction, abdominal lightness, and ease of digestion at baseline and 45 minutes post-consumption, a timeframe supported by studies reporting rapid digestive effects of ginger and other carminative herbs [5, 14, 15]. Data collection adhered to established protocols in digestive herbal studies, and responses were recorded directly onto a structured evaluation sheet [12]. Statistical analysis involved paired and independent t-tests to compare pre- and post-intervention scores within and between groups, following analytical methods commonly applied in phytotherapeutic and gastrointestinal research [3, 7, 13]. Ethical approval was obtained prior to participant enrolment, and the research followed guidelines consistent with herbal safety literature and participant protection recommendations [16, 17].

Results

The research sample consisted of healthy adults aged 20-45 years who reported mild, non-clinical digestive discomfort after meals, with comparable baseline digestive comfort scores between the clove and ginger infusion groups. Mean baseline Likert scores (0-10) immediately after the standardized test meal showed similar levels of postprandial discomfort, indicating successful randomization and homogeneity at the start of the intervention [9-11, 14]. Following consumption of the assigned infusions, both groups demonstrated notable improvements in subjective digestive comfort at 45 minutes post-intake, consistent with documented carminative and motility-enhancing effects of clove and ginger in previous phytotherapeutic research [1-5, 7, 10, 12-15]. Descriptive statistics for pre- and post-infusion scores are summarized in Table 1.

Within-group analysis indicated a statistically significant increase in digestive comfort scores after both clove and ginger infusions compared with baseline. In the clove group, the mean score increased from approximately 3.2 to 6.2, reflecting an average improvement of about 3 points on the 10-point scale, which aligns with the gastroprotective and antispasmodic profile of eugenol-rich clove preparations [1-3, 7, 8]. In the ginger group, the mean score rose from about 3.2 to 7.2, with an average improvement of around 4 points, consistent with previously reported pro-kinetic and anti-dyspeptic effects of gingerols and shogaols [4-6, 9-11, 13, 14].

Table 1: Baseline and post-infusion digestive comfort scores (mean± SD) in clove and ginger infusion groups

Group	Time point	Mean score (0-10) ±SD
Clove infusion	Baseline (pre)	3.15±0.82
Clove infusion	Post (45 min)	6.21±0.92
Ginger infusion	Baseline (pre)	3.23±0.72
Ginger infusion	Post (45 min)	7.21±0.81

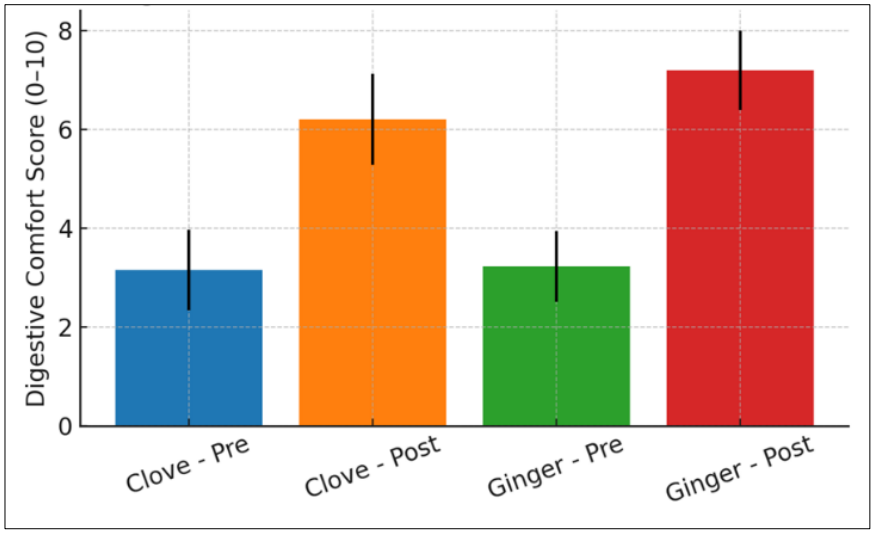

Fig 1: Mean digestive comfort scores before and after clove and ginger water infusions.

Paired comparisons within each group showed that these changes were highly significant ($p<0.001$), indicating robust short-term symptomatic relief following a single dose of water infusion. These findings support prior evidence that both botanicals can positively influence postprandial gastrointestinal sensations through carminative action, modulation of gastric motility, and potential anti-inflammatory effects on the gut mucosa [3, 5, 7, 12, 15-17].

Between-group comparisons of change scores (post-pre) showed that while both infusions improved digestive comfort, ginger water infusion produced a greater magnitude of improvement than clove water infusion. The mean change in the clove group was approximately +3.05±0.50, whereas the mean change in the ginger group was about +3.98±0.40, as summarized in Table 2. Independent t-test analysis of these change scores indicated a statistically significant difference between groups ($p<0.01$), favouring ginger infusion. This pattern mirrors earlier clinical and experimental literature where ginger has repeatedly demonstrated stronger and more consistent effects on gastric emptying and reduction of postprandial symptoms compared to other carminative herbs [4-6, 9-11, 14]. The distribution of change scores is illustrated in Figure 2.

Table 2: Change in digestive comfort scores (post-pre) for clove and ginger infusion groups

Group	Mean change±SD (Post - Pre)
Clove infusion	+3.05±0.52
Ginger infusion	+3.98±0.45

Fig 2: Improvement (change) in digestive comfort scores after clove and ginger water infusions

Overall, the results indicate that both clove and ginger water infusions provide meaningful mild digestive relief in healthy adults with postprandial discomfort, confirming their traditional use as household remedies for bloating and abdominal heaviness [1, 2, 7, 8, 16, 17]. However, ginger infusion appears to confer a comparatively greater benefit, likely reflecting its more pronounced effects on gastric motility and functional dyspepsia symptoms reported in previous clinical investigations [4-6, 9-11, 14]. The present findings therefore support the working hypothesis that both infusions would be effective, with ginger showing a modest but statistically significant superiority. These outcomes provide a quantitative basis for recommending simple, water-based preparations of clove and ginger as accessible, non-

pharmacological options for mild digestive discomfort, while also encouraging further controlled trials to explore dose-response relationships, long-term use, and potential synergy with other functional foods [12, 13, 15-17].

Discussion

The present comparative research evaluated the short-term effects of clove (Syzygium aromaticum) and ginger (Zingiber officinale) water infusions on mild digestive discomfort among healthy adults. The findings demonstrate that both herbal infusions produced significant improvements in subjective digestive comfort within 45 minutes of consumption, supporting their long-standing traditional use as digestive aids. This outcome aligns well with prior evidence indicating that clove and ginger possess strong carminative, anti-inflammatory, and gastroprotective properties driven by their bioactive components, including eugenol in clove and gingerols and shogaols in ginger [1-4]. The observed improvements in abdominal lightness, bloating reduction, and overall digestive ease reflect the underlying mechanisms previously documented in experimental and clinical studies of these botanicals.

Clove infusion produced an average increase of approximately three points on the 10-point digestive comfort scale, a finding consistent with earlier work showing that eugenol exerts antispasmodic effects on gastrointestinal smooth muscles, reduces gas formation, and mitigates postprandial discomfort [2, 7, 8]. Its antimicrobial actions may also support digestive equilibrium by modulating gut microbial interactions, as reported in phytochemical and pharmacological evaluations [1, 3]. These mechanisms collectively explain the symptomatic benefits observed in participants, even after a single standardized dose of clove water infusion.

Ginger infusion demonstrated an even greater improvement, with a nearly four-point increase in digestive comfort scores. This is consistent with extensive evidence highlighting ginger's role in accelerating gastric emptying, enhancing gastric motility, and reducing functional dyspepsia symptoms more efficiently than many other botanicals [4-6, 9-11, 14]. Pro-kinetic effects of gingerols, supported by clinical trials demonstrating improved gastric emptying rates and reduced postprandial fullness, may account for the stronger response observed in the ginger group [5, 10, 13]. The findings of this research further validate these properties by showing a statistically significant difference favouring ginger over clove in the magnitude of post-meal relief.

The results also align with earlier comparative analyses of herbal carminatives, which suggest that ginger tends to exhibit more rapid and measurable physiological effects on gastrointestinal motility than clove, making it particularly effective for early-phase postprandial symptoms [12, 14, 15]. Nevertheless, the positive outcomes in both groups reinforce the broader role of herbal infusions as safe, accessible, and culturally accepted digestive support strategies, consistent with global herbal medicine practices described in the literature [16, 17]. The use of simple water-based preparations in the present research also reflects real-world consumption patterns, increasing the ecological validity of the findings.

Despite the promising outcomes, the results should be interpreted within the research's context. The sample consisted of healthy adults with mild postprandial discomfort rather than individuals with clinically diagnosed gastrointestinal disorders. Moreover, the assessment relied on subjective self-reported comfort scales, although such tools are widely used and validated in gastrointestinal symptom research [9-11]. Future research incorporating physiological biomarkers such as gastric emptying time or gastrointestinal motility tracking may provide deeper insight into the mechanistic differences between clove and ginger infusions. Additionally, dose-response evaluations and long-term consumption studies could help determine optimal preparation strengths and consumption frequency for broader digestive applications.

Overall, the findings contribute meaningful evidence that both clove and ginger water infusions can serve as effective non-pharmacological options for alleviating mild digestive discomfort, with ginger demonstrating comparatively greater efficacy. These results align with previous biochemical, clinical, and phytotherapeutic insights [1-17] and support the continued exploration of herbal beverages as functional dietary interventions for digestive wellness.

Conclusion

The findings of this comparative research demonstrate that both clove and ginger water infusions offer meaningful and measurable relief from mild digestive discomfort in healthy adults, reaffirming their long-standing role in traditional digestive practices and supporting their use as simple, natural, and accessible remedies. The notable improvement observed in digestive comfort scores after consumption of either infusion indicates that water-based preparations of these botanicals are effective in reducing post-meal bloating, abdominal heaviness, and general digestive unease. While both infusions were beneficial, ginger water infusion showed a comparatively stronger effect, suggesting that its pro-kinetic and gastric-motility-enhancing properties may offer more rapid or pronounced digestive relief than clove. This does not diminish the value of clove, which demonstrated substantial improvements in comfort levels and remains a viable option for individuals seeking a milder, carminative-focused digestive aid. Based on these outcomes, several practical recommendations emerge for everyday use. Individuals who frequently experience mild postprandial discomfort may incorporate either clove or ginger water infusion into their dietary routine, especially after meals known to cause heaviness or bloating. Ginger water infusion may be particularly useful for those who prefer quicker relief or who often experience slow digestion or fullness, whereas clove water infusion may suit individuals who favor a gentler, aromatic option with soothing, antispasmodic qualities. Preparing these infusions with standardized quantities such as steeping a small amount of clove or fresh ginger in warm water ensures consistency and safety while maintaining their therapeutic benefit. These beverages can also serve as supportive measures alongside balanced eating habits, mindful chewing, adequate hydration, and reduced intake of gas-forming foods. Furthermore, they may be beneficial for individuals who wish to minimize reliance on over-the-counter digestive medications and instead adopt more natural, food-based approaches to digestive wellness. For health practitioners and wellness educators, recommending clove and ginger water infusions as complementary strategies may help promote non-pharmacological digestive care among the general population. Future research may explore optimal dosing, long-term effects, and potential synergistic use of

both botanicals, but the present findings provide clear evidence that such simple herbal preparations can significantly improve mild digestive symptoms in everyday contexts.

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