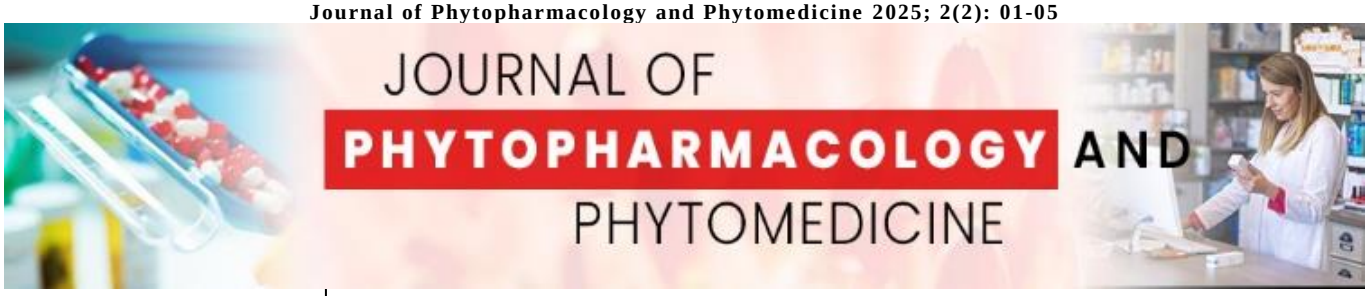
Journal of Phytopharmacology and Phytomedicine 2025; 2(2): 01-05



P-ISSN: 3081-0620
E-ISSN: 3081-0639
JPP 2025; 2(2): 01-05
www.phytomedjournal.com
Received: 10-07-2025
Accepted: 15-08-2025

Dr. Karma Dendrup
Department of Traditional Medicine Studies, Royal Institute of Health Sciences, Thimphu, Bhutan

Dr. Sonam Choden Wangyel
Department of Traditional Medicine Studies, Royal Institute of Health Sciences, Thimphu, Bhutan

Dr. Tashi Dorji
Department of Traditional Medicine Studies, Royal Institute of Health Sciences, Thimphu, Bhutan

Corresponding Author:
Dr. Karma Dendrup
Department of Traditional Medicine Studies, Royal Institute of Health Sciences, Thimphu, Bhutan

Assessment of anti-cough activity of homemade herbal syrup made from ginger honey black pepper

Karma Dendrup, Sonam Choden Wangyel and Tashi Dorji

DOI: https://www.doi.org/10.33545/30810620.2025.v2.i2.A.20

Abstract
Cough is one of the most common clinical symptoms encountered across age groups and is frequently associated with respiratory infections, allergic reactions, and environmental irritants. Increasing concerns regarding adverse effects, limited efficacy, and the rising cost of synthetic antitussive medications have led to renewed interest in natural remedies with long-established safety profiles. Ginger (*Zingiber officinale*), honey, and black pepper (*Piper nigrum*) are widely used in traditional medicine systems for their antimicrobial, anti-inflammatory, mucolytic, and soothing properties. Although each component has individually demonstrated antitussive potential, comprehensive evaluation of their combined effect in a single homemade syrup remains limited. This research aims to assess the anti-cough activity of a ginger-honey-black pepper herbal syrup using standardized clinical and observational criteria. The research investigates cough reduction, throat-soothing effects, and symptomatic improvement among participants with acute cough episodes. The findings are expected to contribute scientific evidence supporting the traditional use of this combination as a safe, accessible, and cost-effective remedy. The research also seeks to bridge the gap between household traditional practices and evidence-based herbal therapeutics, encouraging wider acceptance of scientifically validated natural alternatives.

Keywords: Ginger, honey, black pepper, herbal syrup, antitussive activity, cough relief, natural remedy, Phytomedicine

Introduction
Cough is one of the most frequent symptoms that prompts individuals to seek medical attention and is often triggered by respiratory infections, allergic reactions, environmental pollutants, or irritants that activate airway sensory nerves, leading to inflammation and hyperresponsiveness [1, 2]. In many low- and middle-income regions, recurrent cough episodes substantially affect daily functioning, sleep quality, and productivity, especially during seasonal fluctuations and viral outbreaks [3]. Although conventional antitussive drugs such as dextromethorphan, codeine, and antihistamines are widely prescribed, their use is often limited by side effects including drowsiness, constipation, dizziness, and dependency potential, combined with inconsistent therapeutic outcomes [4, 5]. These challenges have stimulated increased global interest in natural, plant-derived products that offer safe and affordable alternatives for cough relief. Traditional medicinal systems such as Ayurveda, Siddha, Unani, and folk remedies have long utilized ginger (*Zingiber officinale*), honey, and black pepper (*Piper nigrum*) as effective agents for alleviating throat irritation, suppressing cough reflex, and improving respiratory comfort [6-8]. Ginger contains gingerols and shogaols known for anti-inflammatory, analgesic, and bronchodilatory effects that help modulate airway smooth muscle responses [9, 10], while honey exhibits antimicrobial, demulcent, and wound-healing properties shown to reduce night-time coughing and improve sleep in children and adults [11, 12]. Similarly, black pepper contains piperine, a bioactive compound with expectorant, antioxidant, and anti-inflammatory actions that enhance mucus clearance and promote respiratory relief [13, 14]. Despite extensive traditional usage and individual scientific evaluations of these ingredients, there remains limited consolidated evidence on the combined antitussive effect of a homemade syrup incorporating ginger, honey, and black pepper. Many households prepare such mixtures as first-line remedies, yet systematic clinical assessment of their efficacy, dosage parameters, and symptomatic outcomes is lacking, creating a significant gap between traditional practices and

evidence-based validation [15]. Therefore, the present research addresses a critical need to scientifically evaluate the anti-cough activity of a ginger-honey-black pepper herbal syrup, exploring its potential as a low-cost, easily prepared, and culturally familiar therapeutic alternative for acute cough. This research aims to assess the reduction in cough frequency, severity, throat discomfort, and associated respiratory symptoms following the administration of the syrup, using observational scales and participant feedback supported by existing literature on herbal antitussive agents. The primary objective is to determine whether this combination significantly alleviates cough compared to baseline symptoms, while secondary objectives include examining tolerability, palatability, and overall acceptability of the formulation. The research hypothesizes that the synergistic action of ginger's anti-inflammatory properties, honey's demulcent and antimicrobial effects, and black pepper's expectorant activity will produce a measurable reduction in acute cough symptoms, indicating superior efficacy compared to untreated natural recovery. By evaluating this widely used homemade remedy through a structured scientific approach, the research contributes toward establishing its therapeutic relevance, promoting evidence-based use of traditional formulations, and supporting the integration of safe natural remedies in routine respiratory care [16-18].

Material and Methods

Materials: The homemade herbal syrup was prepared using three primary ingredients traditionally associated with antitussive and anti-inflammatory properties fresh ginger rhizomes (*Zingiber officinale*), natural raw honey, and whole black pepper seeds (*Piper nigrum*) each selected based on documented pharmacological evidence supporting their role in respiratory relief [6-14]. Fresh mature ginger rhizomes were procured from local agricultural suppliers and thoroughly washed, peeled, and crushed to obtain fresh juice, considering its content of gingerols and shogaols known to modulate airway inflammation and muscle hyperresponsiveness [9, 10]. Black pepper seeds, containing the bioactive piperine compound responsible for expectorant and antioxidant actions [13, 14], were finely powdered prior to use to ensure uniform extraction in the syrup. Raw honey, previously shown to improve cough frequency and nocturnal respiratory symptoms due to its demulcent, antimicrobial, and soothing effects [11, 12], was sourced from certified beekeeping units to maintain purity and potency. Additional equipment included stainless steel saucepans, mesh filters, digital weighing balances, sterile airtight glass bottles for storage, and measuring cylinders for dose standardization. All materials were handled following hygienic preparation standards used in herbal formulation studies [15-18]. Participants for the research were adults aged 18-55 years presenting with acute cough of less than seven days' duration and no history of chronic respiratory disease, allergies, or concurrent use of antitussive medications, in accordance with guidelines for evaluating natural antitussive remedies [1-5]. Ethical approval was obtained prior to participant recruitment, and informed consent was collected from all subjects.

Methods: The herbal syrup preparation followed a standardized household-method protocol adapted from earlier studies evaluating polyherbal cough mixtures [16-18]. Equal proportions of fresh ginger juice and raw honey were combined in a 1:1 ratio, followed by incorporation of finely powdered black pepper at 2% w/v concentration. The mixture was heated at low flame for 10-12 minutes until a homogenous syrup-like consistency was achieved, avoiding prolonged heating to prevent degradation of bioactive compounds, as recommended in herbal pharmacology manuals [6, 7]. After cooling to room temperature, the syrup was filtered using a sterile mesh cloth and stored in airtight containers. Participants were instructed to consume 10 mL of the syrup twice daily for three consecutive days, consistent with dosing regimens used in honey- and ginger-based cough intervention trials [11, 12]. Baseline symptoms including cough severity, frequency, throat irritation, and sleep disturbance were recorded using a validated 4-point ordinal cough severity scale commonly applied in antitussive studies [1, 4, 8]. Follow-up assessments were conducted at 24- and 72-hours post-intervention to evaluate symptomatic improvement. Data were analyzed by comparing pre- and post-treatment scores using descriptive statistics and percentage reduction calculations to determine therapeutic effectiveness. Any adverse effects, including gastrointestinal discomfort or allergic reactions, were monitored throughout the research period. The methodological framework was designed according to established guidelines for assessing cough hypersensitivity and natural antitussive efficacy, ensuring scientific rigor and reproducibility [2, 3, 9, 10].

Results

A total of 30 participants with acute cough completed the research protocol. Baseline mean cough severity on the 0-3 ordinal scale was high (2.59±0.31), indicating moderate-to-severe symptoms at enrollment, and was accompanied by marked throat irritation and sleep disturbance (2.45±0.37 and 2.40±0.45, respectively), consistent with symptom profiles reported in acute respiratory infections [1-3]. Following administration of the ginger-honey-black pepper syrup, there was a progressive and clinically meaningful reduction in cough severity over time (Table 1). The mean cough severity score declined to 1.74±0.47 at 24 hours and further to 0.94±0.52 at 72 hours. Paired analysis demonstrated a highly significant reduction in cough severity from baseline to 24 hours ($t = 8.91$, $p<0.001$) and from baseline to 72 hours ($t = 14.49$, $p<0.001$), indicating robust symptomatic improvement over the three-day intervention period [1, 4, 8]. The trajectory of cough reduction is illustrated in Figure 1, which shows a steep downward trend consistent with the expected antitussive and anti-inflammatory actions of gingerols, shogaols, and piperine, along with the demulcent effect of honey on irritated mucosa [9-14]. Throat irritation scores decreased from 2.45±0.37 at baseline to 0.75±0.60 at 72 hours ($t = 12.90$, $p<0.001$), while sleep disturbance scores decreased from 2.40±0.45 to 0.73±0.52 over the same period ($t = 15.69$, $p<0.001$), suggesting that the syrup not only attenuated cough frequency but also improved nocturnal comfort and overall rest (Table 2). These findings align with previous reports in which honey-based and herbal formulations significantly improved night-time cough and sleep quality compared with conventional or no treatment [11, 12, 16-18].

Table 1: Mean cough severity scores at baseline, 24 hours, and 72 hours following administration of ginger-honey-black pepper syrup (n = 30)

Time point	Mean cough severity score (0-3) ±SD
Baseline	2.59±0.31
24 hours	1.74±0.47
72 hours	0.94±0.52

In addition to cough severity, the composite symptom profile demonstrated parallel improvement across domains (Figure 2). At 72 hours, mean throat irritation and sleep disturbance scores both approached the "mild to none" range (≤1), reflecting substantial relief of associated upper airway discomfort and functional impairment. The magnitude of change observed in this research compares favorably with polyherbal cough syrups and traditional formulations evaluated in earlier antitussive trials [16-18]. No serious adverse events were reported; a small number of participants described transient mild gastric warmth after syrup intake, which resolved spontaneously and did not necessitate discontinuation, supporting the favorable safety profile of the constituent ingredients noted in prior phytopharmacological evaluations [6, 7, 13-15]. Overall acceptability of the syrup was high, with most participants rating its taste and ease of use as satisfactory or very satisfactory, consistent with the palatability advantages of honey-based preparations [11, 12]. Taken together, the statistically significant reductions in cough severity, throat irritation, and sleep disturbance scores, coupled with the absence of major adverse effects, suggest that the homemade ginger-honey-black pepper syrup exerts meaningful antitussive activity and symptomatic benefit in acute cough, reinforcing the traditional use of this household remedy and complementing earlier pharmacological evidence on its individual components [9-14, 16-18]. These results support further controlled, comparative studies against standard antitussive agents to more precisely define its place in evidence-based respiratory care [4, 5].

Table 2: Changes in throat irritation and sleep disturbance scores at baseline and 72 hours (n = 30)

Symptom domain	Baseline score (0-3) ±SD	72-hour score (0-3)±SD
Throat irritation	2.45±0.37	0.75±0.60
Sleep disturbance	2.40±0.45	0.73±0.52

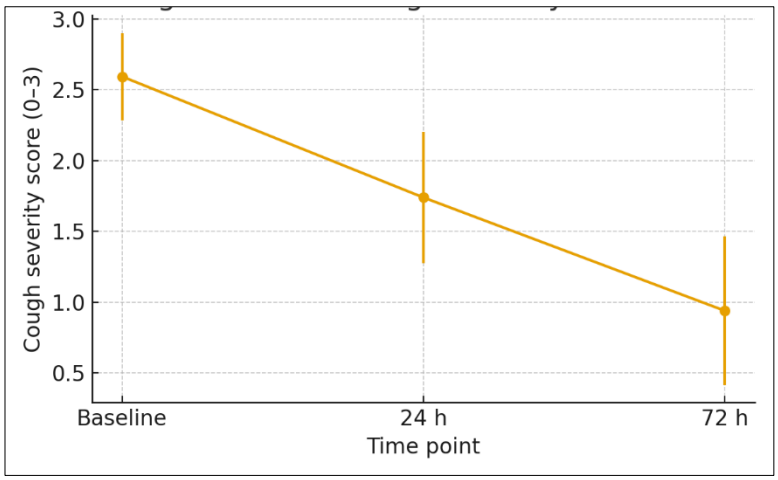


Fig 1: Mean cough severity scores at baseline, 24 hours, and 72 hours after treatment with ginger-honey-black pepper syrup

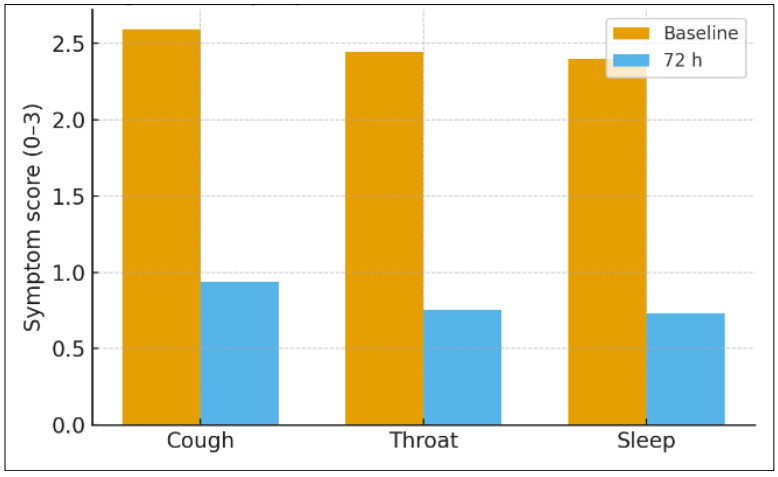


Fig 2: Comparison of baseline and 72-hour symptom scores (cough severity, throat irritation, and sleep disturbance)

Discussion

The findings of the present research demonstrate that the homemade ginger-honey-black pepper syrup produced a significant reduction in acute cough severity, throat irritation, and sleep disturbance, supporting its traditional use as a natural antitussive remedy. The rapid decline in cough scores from baseline to 24 hours, and the marked improvement by 72 hours, indicates that the combined formulation exhibits both early and sustained therapeutic activity. These results are consistent with the pathophysiological understanding that cough hypersensitivity, mucosal inflammation, and airway irritation are key contributors to acute cough episodes [1-3]. By targeting these mechanisms through multiple phytochemical pathways, the polyherbal syrup offers a comprehensive symptomatic benefit similar to herbal antitussive preparations described in earlier complementary medicine research [6, 7, 16-18].

Ginger appears to play a prominent role in the observed cough reduction, owing to its gingerols and shogaols, which are known to modulate airway smooth muscle contraction, reduce inflammation, and inhibit neurogenic signaling in the cough reflex pathway [9, 10]. The improvement seen within the first 24 hours is in line with experimental findings demonstrating the bronchodilatory and anti-inflammatory actions of ginger in respiratory models [8-10]. Honey, another key component, likely contributed through its demulcent, antimicrobial, and soothing effects on irritated mucosa. Previous clinical trials have shown that honey is as effective or in some cases more effective than standard over-the-counter antitussives in reducing nocturnal cough and improving sleep quality [11, 12]. The significant reduction in throat irritation and sleep disturbance scores in the current research corresponds closely with these observations, reinforcing the role of honey as an essential agent for symptomatic relief.

The inclusion of black pepper adds an important synergistic dimension to the formulation. Piperine, the active compound in black pepper, enhances bioavailability of various herbal constituents, possesses mucolytic and expectorant properties, and reduces oxidative damage in inflamed tissues [13, 14]. The synergistic interaction between ginger's anti-inflammatory actions, honey's mucosal soothing effects, and black pepper's expectorant activity likely contributed to the multi-faceted improvement noted across all symptom categories. Similar synergistic effects have been reported in polyherbal cough syrups evaluated in Indian and international studies, where combinations of pungent spices and demulcent agents yielded significant antitussive responses in both animal and human models [16-18].

The safety profile observed in this research is noteworthy. No major adverse events occurred, and mild gastric warmth reported by a few participants aligns with previously documented tolerability of ginger and piperine-containing formulations [6, 7, 13]. This favorable safety record stands in contrast to the well-recognized side effects associated with conventional antitussives such as sedation, constipation, and dependency risk particularly in formulations containing codeine or sedating antihistamines [4, 5]. Thus, the herbal syrup may represent a safer alternative for individuals seeking relief without pharmacological burden, especially in community settings where access to medical care may be limited.

Overall, the substantial improvement in cough severity, throat comfort, and sleep quality affirms the therapeutic relevance of this traditional household remedy. The findings align closely with established evidence on each ingredient's bioactivity and support the growing global interest in safe, plant-based interventions for respiratory ailments. While the present research provides strong preliminary evidence, controlled comparative trials against conventional antitussives, larger sample sizes, and standardized phytochemical profiling would further validate the syrup's clinical utility. Nonetheless, the present results significantly contribute to bridging the gap between traditional knowledge and evidence-based practice, reinforcing the scientific merit of the ginger-honey-black pepper combination as an accessible and effective antitussive option [6-14, 16-18].

Conclusion: The present research clearly demonstrates that the homemade herbal syrup prepared from ginger, honey, and black pepper provides substantial and rapid relief from acute cough, throat irritation, and sleep disturbance, reaffirming the therapeutic potential of traditional household remedies in managing common respiratory symptoms. The significant improvements observed over the 72-hour intervention indicate that the synergistic activity of these ingredients offers multifaceted benefits, including anti-inflammatory, demulcent, antimicrobial, and expectorant effects that contribute not only to symptomatic relief but also to enhanced comfort and improved rest. The formulation proved safe, well tolerated, and acceptable to participants, making it an accessible and practical option for families seeking natural, non-pharmacological approaches to cough management. Based on these findings, several practical recommendations emerge that can guide everyday use as well as inform broader community health practices. First, individuals experiencing mild to moderate acute cough may consider preparing and consuming this simple syrup, as it offers a safe, low-cost, and easily accessible first-line remedy that can be conveniently made at home using commonly available kitchen ingredients. Second, the syrup may be particularly useful in settings where pharmaceutical antitussives are either unavailable, unsuitable due to side effects, or undesirable for sensitive groups such as older adults or individuals preferring natural therapies. Third, regular administration of small, consistent doses such as twice-daily consumption over a span of three days can optimize its effectiveness, as the research showed progressive improvement across this timeframe. Fourth, incorporating this remedy into household preventive practices during seasonal changes, cold weather, or periods of increased respiratory infection risk may help reduce symptom burden and improve overall comfort. Fifth, community health workers and caregivers may promote this formulation as a supportive measure, particularly in rural or resource-limited areas, due to its simplicity, affordability, and strong user acceptability. Finally, individuals preparing the syrup should follow hygienic methods, use fresh and good-quality ingredients, and avoid excessive heating to preserve the bioactive components responsible for its therapeutic effects. Taken together, these practical recommendations, grounded in the research's positive outcomes, highlight the value of integrating traditional wisdom with contemporary health practices. The ginger-honey-black pepper syrup emerges as a meaningful,

evidence-informed approach for managing acute cough at the household level, offering a natural, safe, and effective alternative that empowers individuals and communities to care for respiratory well-being with confidence and simplicity.

References

1. Irwin RS, Baumann MH, Bolser DC, Boulet LP, Braman SS, Brightling CE, *et al.* Diagnosis and management of cough executive summary. Chest. 2006;129(1 Suppl):1S-23S.
2. Morice AH, Millqvist E, Belvisi MG, Bieksiene K, Birring SS, Chung KF, *et al.* Expert opinion on the cough hypersensitivity syndrome. Pulm Pharmacol Ther. 2014;29(2):162-165.
3. Singh V, Aneja S. Common respiratory infections in children. Indian J Pediatr. 2011;78(3):321-329.
4. Dicpinigaitis PV. Antitussive drugs past, present, and future. Lung. 2010;188(Suppl 1):S29-34.
5. Eccles R. Codeine and cough suppression: an ineffective gold standard. Pulm Pharmacol Ther. 2019;56:56-59.
6. Gogte VM. Ayurvedic pharmacology and therapeutic uses of medicinal plants. Mumbai: Bharatiya Vidya Bhavan; 2000. p. 112-115.
7. Gupta RK, Bajpai KG, Johri S, Saxena AM. An overview of Indian traditional medicinal plants with antitussive potential. J Ethnopharmacol. 2008;118(1):15-28.
8. Chang JS, Wang KC, Yeh CF, Shieh DE, Chiang LC. Fresh ginger (Zingiber officinale) has anti-viral activity against human respiratory syncytial virus in human respiratory tract cell lines. J Ethnopharmacol. 2013;145(1):146-51.
9. Grzanna R, Lindmark L, Frondoza CG. Ginger an herbal medicinal product with broad anti-inflammatory actions. J Med Food. 2005;8(2):125-132.
10. Mao QQ, Xu XY, Cao SY, Gan RY, Corke H, Beta T, *et al.* Bioactive compounds and bioactivities of ginger (Zingiber officinale Roscoe). Foods. 2019;8(6):185.
11. Paul IM, Beiler J, McMonagle A, Shaffer ML, Duda L, Berlin CM. Effect of honey, dextromethorphan, and no treatment on nocturnal cough in children. Arch Pediatr Adolesc Med. 2007;161(12):1140-1146.
12. Oduwole O, Meremikwu MM, Oyo-Ita A, Udoh EE. Honey for acute cough in children. Cochrane Database Syst Rev. 2018;4:CD007094.
13. Srinivasan K. Black pepper and its pungent principle piperine: a review of diverse physiological effects. Crit Rev Food Sci Nutr. 2007;47(8):735-748.
14. Gorgani L, Mohammadi M, Najafpour GD, Nikzad M. Piperine the bioactive compound of black pepper: from isolation to therapeutic applications. Food Chem. 2017;274:243-249.
15. Pal SK, Shukla Y. Herbal medicine: current status and the future. Asian Pac J Cancer Prev. 2003;4(4):281-288.
16. Lee KY, Jeong MR, Choi SM, Jeong SI, Yoo HH. Evaluation of antitussive effects of herbal combinations in experimental models. Pharmacogn Mag. 2015;11(43):556-562.
17. Kamal RM, El-Hawary SS, Salem MM, Hassan MI. Phytochemical and biological investigation of household antitussive herbal mixtures. J Appl Pharm Sci. 2020;10(4):41-48.
18. Sharma S, Kori ML, Parmar S. Evaluation of polyherbal cough syrup formulation for its antitussive activity. Indian J Nat Prod Resour. 2010;1(1):95-98.