Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 22s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Enrichment of honey with flavour of ginger

Amit Kumar Patel[1], Mr. Saty Saran[2], Dr. K. Prakash[3], Dr. Mukesh Anandrao Laichattiwar[4], Adrita Banerjee[5], Dr. Deepa M Madalageri[6], Dr. S. Marimuthu[7], Ali Assaba Mohammed Shafi[8], Dr. Rathodlal Singh[9]

[1]Assistant Professor Dr. C V Raman University,Bihar

[2]Assistant Professor, Department- Entomology Institute U.P. Autonomous college, Varanasi.

[3]Assistant Professor and Head, SRM College of Agricultural Sciences, Vendhar Nagar, Baburayanpettai,TN ,

[4]Assistant Professor, Department of Entomology, College of Agriculture, Parul University, Vadodara Gujarat,

[5]Research Scholar, Department of Food Technology, Faculty of Life & Allied Health Sciences, MS Ramaiah University of Applied Sciences, Bangaluru,

[6]assistant Professor ,Department Of Foodtechnology Ramaiah University Of Applied Sciences Bangaluru

[7]Assistant Professor (Sr. Grade), Department of Agronomy, SRM College of Agricultural Sciences, SRM Institute of Science and Technology, Baburayanpettai, TN

[8]Department of Entomology, Bihar Agricultural University, Bihar

[9]Assistant Professor, S R University , Warangal

***Corresponding Author:**
Amit Kumar Patel
Email ID: akpatel866@gmail.com

Cite this paper as: Amit Kumar Patel, Mr. Saty Saran, Dr. K. Prakash, Dr. Mukesh Anandrao Laichattiwar, Adrita Banerjee, Dr. Deepa M Madalageri, Dr. S. Marimuthu, Ali Assaba Mohammed Shafi, Dr. Rathodlal Singh, (2025) Enrichment of honey with flavour of ginger. *Journal of Neonatal Surgery*, 14 (22s), 710-713.

ABSTRACT

In response to rising consumer demand for natural, health-promoting, and flavourful food products, this study investigates the development and characterization of a novel functional honey-based product: ginger honey. The aim was to evaluate the effects of ginger incorporation on the sensory attributes, physicochemical properties, antioxidant capacity, and antibacterial activity of honey. Sensory evaluation revealed that the addition of ginger introduced woody and fresh notes, along with increased astringency and bitterness, while decreasing sweetness, floral aroma, fruity notes, and overall acceptability.

Physicochemical analyses indicated that ginger significantly increased colour intensity, moisture content, water activity, electrical conductivity, pH, and reducing sugar content, while reducing the total sugar content. Antioxidant capacity, measured through total phenolic content, iron chelating ability, superoxide anion, and hydroxyl radical scavenging activities, was notably enhanced due to ginger's bioactive constituents such as gingerol and phenolic compounds. Antibacterial testing using agar well diffusion assay showed increased inhibitory effects of ginger honey against *Enterococcus faecalis*, suggesting synergism between honey and ginger components. However, no significant antibacterial enhancement was observed against *Pseudomonas aeruginosa*.

While ginger fortification enhanced the functional qualities of honey, it negatively impacted sensory acceptability. This trade-off highlights the need for formulation optimization to balance health benefits with consumer preferences. The study supports ginger honey's potential as a value-added functional food with enriched antioxidant and antimicrobial properties.

Keywords: *Ginger honey, functional food, sensory analysis, antioxidant activity, antibacterial properties, phenolic compounds, physicochemical properties, consumer acceptability.*

1. INTRODUCTION

Honey, a natural sweetener produced by Apis mellifera, has long been recognized for its nutritional and medicinal properties. Its sensory appeal—marked by unique taste, aroma, and texture—combined with its bioactive potential, has made it a staple in diets and traditional medicine across cultures. The functional value of honey stems largely from its complex composition, including phenolic acids, flavonoids, enzymes, vitamins, and trace minerals. These constituents collectively contribute to its

antioxidant and antibacterial activities, making honey a valuable therapeutic agent for treating ailments such as cough, indigestion, and immune deficiencies (Ahmed *et al.*, 2018; Aljohar *et al.*, 2018). Honey's antibacterial efficacy is further enhanced by its low water activity, high sugar content, low pH, and significant polyphenolic content, which together inhibit the growth of pathogenic microbes including Pseudomonas aeruginosa, Staphylococcus aureus, and Escherichia coli (Karabagias *et al.*, 2018; Dżugan *et al.*, 2018). Ginger (*Zingiber officinale*), an ancient spice and medicinal herb, is another natural product renowned for its potent bioactive properties. Its characteristic pungency and aroma arise from a wide array of phenolic compounds, including gingerols, shogaols, and paradols, which have been scientifically validated for their antioxidant, anti-inflammatory, and antimicrobial properties (Cianciosi. et al., 2018). Beyond its culinary uses, ginger is used in both modern and traditional medicine to manage conditions such as respiratory infections, digestive disorders, and metabolic syndromes (El Kutry, *et al.*, 2019). The antimicrobial capacity of ginger, attributed to active compounds like zingerone and quercetin, has shown promise against a range of microbial pathogens including Salmonella typhi, Bacillus subtilis, and Escherichia coli (González *et al.*, 2008; Minden *et al.*, 2018).

In recent years, there has been a surge in the demand for food products that not only satisfy nutritional needs but also offer added health benefits. This consumer trend has encouraged innovation in the development of functional foods by combining natural bioactive ingredients. One such innovation is ginger honey, which blends the health-promoting properties of both honey and ginger. Although the individual benefits of these substances are well-documented, limited studies have thoroughly investigated the combined effects in a single product (Munda *et al.*, 2018; Otmani *et al.*, 2021). The purpose of this study was to explore the sensory, physicochemical, and biological properties of ginger-infused honey.

2. MATERIAL AND METHOD

For this study, three different types of honey samples were selected, all produced locally by farmers of Muzaffarpur districts of Bihar. The honey used in this research was harvested from *Apis cerana*, a species of honey bee known for producing high-quality natural honey in tropical and subtropical regions. This bee species is well-suited to the Bihar climate and forages in a biodiverse rainforest environment, which contributes to the unique characteristics of the honey.

To ensure consistency and preserve the integrity of the honey during the research process, all samples were carefully stored under controlled conditions. Each sample container was tightly sealed using parafilm to prevent contamination, moisture absorption, and unwanted fermentation. The honey samples were kept in a dark storage box at room temperature, minimizing exposure to sunlight and reducing the risk of crystallization—both of which can negatively affect honey's physical properties and bioactive components. These storage practices were adopted to maintain the honey's natural quality and ensure accurate and reliable results throughout the experimentation phase (Albaridi, *et al.*, 2019).

The three honey samples used in the study are listed below:

Details of honey samples

Symbol	Product	Ingredient
H1	Rainforest wild raw honey	Rainforest wild raw honey
H2	Ginger Honey (Honey with 10% ginger)	Rainforest wild raw honey, 10% ginger
H3	Ginger Honey (Honey with 18% ginger)	Rainforest wild raw honey, 18% ginger

3. RESULT AND CONCLUSION

Evaluating honey and honey-based products, two key sensory attributes stand out—appearance and texture. In this context, a study explored how the addition of ginger at different concentrations influenced the visual and textural characteristics of honey. Four different samples were compared: sugar solution, original honey, honey infused with 10% ginger, and honey with 18% ginger. The findings revealed some interesting differences across the samples. The colour of a food product often gives the first impression to the consumer. In this comparison, there were only slight differences in colour intensity among the samples. The original honey had the lightest colour, with an intensity score of 50.0%. Slightly darker was the sugar solution at 57.5%, followed by the honey with 10% ginger, which scored 62.5%. The honey infused with 18% ginger was the darkest among them all, reaching a colour intensity of 67.5%. These changes suggest that adding ginger can slightly deepen the colour of honey, possibly due to the natural pigments and compounds in ginger.

While colour differences were modest, the textural attributes—specifically viscosity and adhesiveness—showed far more pronounced variations. Viscosity refers to how thick or runny a liquid is, while adhesiveness reflects how sticky the substance feels. Among the four samples, honey with 10% ginger stood out for having the highest viscosity at 92.5%, making it the thickest. It also scored the highest in adhesiveness at 87.5%, indicating a stronger cling or stickiness. On the opposite end of the spectrum was the sugar solution, which had the lowest viscosity (22.5%) and adhesiveness (20%). These results clearly

demonstrate that the sugar solution lacks the richness and texture that honey, especially ginger-infused honey, offers. The original honey fell in between, with a viscosity of 70% and adhesiveness of 72.5%, while the honey with 18% ginger had slightly lower viscosity at 67.5% but a slightly higher adhesiveness of 75%. In summary, adding ginger to honey not only affects its colour but significantly enhances its texture. The 10% ginger honey in particular emerged as the thickest and stickiest, which may appeal to consumers seeking richer, more flavourful alternatives to standard honey. These findings highlight how natural additives like ginger can enhance both the sensory appeal and potential functional properties of honey products.

The mean value for colour intensity and pH of original honey (H1), honey with 10% ginger (H2) and honey with 18% ginger (H3).

Honey samples	**H_1**	**H_2**	**H_3**
Colour intensity (mAU)	207.67 ± 1.53a	289.00 ± 1.00c	275.00 ± 3.00b
pH	4.58 ± 0.01 a	4.84 ± 0.01	4.85 ± 0.02b

The measurements were performed in triplicates and the average values were expressed in mean ± standard deviation. a indicated significant difference between H1 and H2 with $p < 0.05$. b indicated significant difference between H1 and H3 with $p < 0.05$. c indicated significant difference between H2 and H3 with $p < 0.05$.

Honey samples	**H_1**	**H_2**	**H_3**
Total sugar content (%)	80.10 ± 0.00	81.30 ± 0.00	78.70 ± 0.00
Reducing sugar content (%)	59.53 ± 0.30a	60.63 ± 0.67	63.27 ± 0.21b
Moisture content (%)	19.90 ± 0.00	18.70 ± 0.00	21.30 ± 0.00
Water activity	0.54 ± 0.00 0	0.54 ± 0.00c	0.55 ± 0.00

The measurements were performed in triplicates and the average values were expressed in mean ± standard deviation. a indicated significant difference between H1 and H2 with $p < 0.05$. b indicated significant difference between H1 and H3 with $p < 0.05$. c indicated significant difference between H2 and H3 with $p < 0.05$.

The mean value for zone of inhibition of agar well diffusion assay of sugar solution, original honey (H1), honey with 10% ginger (H2) and honey with 18% ginger (H3).

Honey samples	**E. faecalis**	**P. aeruginosa**
SS	**X**	**X**
H1	**0.00 ± 0.00a**	**0.92 ± 0.09**
H2	**0.83 ± 0.09**	**0.93 ± 0.04**
H3	**0.75 ± 0.09b**	**0.96 ± 0.01**

Funding Status – I have got External fund from AGU-CRIG for the "*Study on Rearing & Innovative Production Method of Honey Bee under Flavourization of Aromatic & Medicinal Plant and setting up a Bee Farm in the University"* funding ID is CRIG-AGU/CVRU-V/2023/01 at Department of Agriculture Dr. C V Raman University, Bihar

REFERENCES

[1] Albaridi, N., 2019. Antibacterial potency of honey. International Journal of Microbiology, 2019, pp. 1-10.

[2] Ahmed, M. and Baptiste, K., 2018. Vancomycin-resistant enterococci: a review of antimicrobial resistance mechanisms and perspectives of human and animal health. Microbial Drug Resistance, 24(5), pp. 590-606.

[3] Aljohar, H.I. et al., 2018. Physical and chemical screening of honey samples available in the Saudi market: an important aspect in the authentication process and quality assessment. Saudi Pharmaceutical Journal: The Official Publication of the Saudi Pharmaceutical Society, 26(7), pp. 932-942.

[4] Cianciosi, D. et al., 2018. Phenolic compounds in honey and their associated health benefits: a review. Molecules, 23, pp. 2321-2322.

[5] Dżugan, M., Tomczyk, M., Sowa, P. and Grabek-Lejko, D., 2018. Antioxidant activity as biomarker of honey variety. Molecules, 23(8), pp. 2069-2071.

[6] El Kutry, M.S., 2019. Potential protection effect of using honey, ginger, and turmeric as a natural treatment against chemotherapy of intestinal toxicity. Journal of Biologically Active Products from Nature, 10(2), pp. 86 – 99.

[7] González Lorente, M., De Lorenzo Carretero, C. and Martín, R.P., 2008. Sensory attributes and antioxidant capacity of Spanish honeys. Journal of Sensory Studies, 23(3), pp. 293-302.

[8] Karabagias, I., Louppis, A., Kontakos, S., Drouza, C. and Papastephanou, C., 2018. Characterization and botanical differentiation of monofloral and multifloral honeys produced in Cyprus, Greece, and Egypt using physicochemical parameter analysis and mineral content in conjunction with supervised statistical techniques. Journal of Analytical Methods in Chemistry, 2018, pp. 1-10.

[9] Minden-Birkenmaier, B. and Bowlin, G., 2018. Honey-based templates in wound healing and tissue engineering. Bioengineering, 5(2), pp. 1-27.

[10] Munda, S., Dutta, S., Haldar, S. and Lal, M., 2018. Chemical analysis and therapeutic uses of ginger (Zingiber officinale Rosc.) essential oil: a review. Journal of Essential Oil Bearing Plants, 21(4), pp. 994-1002.

[11] Otmani, I., Abdennour, C., Dridi, A., Kahalerras, L., and Halima-Salem, A., 2019. Characteristics of the bitter and sweet honey from Algeria Mediterranean coast. Veterinary world, 12(4), pp. 551-557.