



# THE HONEY TRAP: IS HEATED HONEY REALLY THAT BAD?

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## ABSTRACT

**Introduction-** The consumption of honey mixed with hot water or heated honey has been a practice. However, concerns have arisen regarding the potential harmful effects of this practice, both according to Ayurvedic principles and scientific evidence. Ayurveda, the ancient Indian system of medicine, emphasizes the importance of consuming honey (Madhu) in its raw, unheated form. Acharyas have mentioned that heating honey alters its chemical properties, transforming it into a substance that is visha (poison) to the body. A dooshi visha, or "unnatural substance," is any substance that can disrupt the balance of the doshas and contribute to disease. When honey is heated, it undergoes a chemical transformation, leading to the formation of a compound called 5-hydroxymethylfurfural (HMF). HMF can be considered a dooshi visha in Ayurveda due to its potential to disrupt the delicate balance of the doshas. According to Ayurvedic principles, the doshas are in a constant state of flux, and their balance is essential for maintaining health. HMF, with its propensity to alter the doshas, can throw this equilibrium off, leading to various health problems.

**Aims and Objectives:** To understand the effect of consuming heated honey (Madhu) on humans.

**Materials and Methods:** Modern textbooks and Authenticated sources were scrutinized for the understanding of properties, chemical composition of honey and ayurvedic textbooks were scrutinized for further understanding.

**Conclusion and Discussion:** Based on both Ayurvedic principles and scientific evidence, it is advisable to consume honey in its raw, unheated form to reap its full health benefits and minimize potential risks. While honey mixed with hot water or heated honey may be part of practices, these methods may compromise the beneficial properties of honey and pose potential health concerns.

**KEY WORDS-** Honey, Madhu, Visha, dooshi visha, HMF.

## INTRODUCTION

Honey, the golden nectar adored for centuries, transcends its delicious reputation to hold immense significance in both modern science and Ayurveda, the ancient Indian healing system. In Ayurveda, Believed to balance all three doshas – Vata, Pitta, and Kapha – honey is revered as a Rasayana, an elixir promoting longevity and rejuvenation. Its antimicrobial, anti-inflammatory, and wound-healing properties find mention in countless ancient texts, highlighting its efficacy in treating various ailments. From a scientific lens, honey is a complex natural concoction, brimming with over 200 unique components. Sugars like fructose and glucose provide its signature sweetness, while prebiotics, vitamins, minerals, and potent antioxidants like flavonoids and phenolic acids endow it with remarkable health-promoting properties. Honey or Madhu, has long been revered for its sweetness, healing properties, and symbolic significance in Ayurveda. However, a hidden "trap" lurks within its essence – the potential dangers of heat. Science unveils the delicate dance of molecules within honey.

**AIMS AND OBJECTIVES-** To understand the effect of consuming heated honey (Madhu) on humans both as per ayurveda and modern science.

**MATERIALS AND METHODS:** Modern textbooks and Authenticated sources were scrutinized for the understanding of properties, chemical composition of honey and ayurvedic textbooks were scrutinized for properties of Madhu, mode of consumption and precautions before eating hone and to understand its effect on healthy person.

## REVIEW OF LITERATURE

**Nirukti (Etymology) of Madhu** <sup>[1]</sup>: The word Madhu is said to be derived from "Manyat iti madhu" meaning delicious, sweet and pleasant.

**Synonyms of Madhu as per Ayurveda** <sup>[2-6]</sup>- Madhu, Makshika, Kshoudra, Pushpasava, Kusumasava, Makshikavita, Pushparasa, Pushparasodbhava, Pavitra.

**Synonyms of Honey in modern science:** Honey, purified honey, clarified honey, strained honey.

**Characters of Honey-** Chemical Composition:

- Sugars: Honey is primarily composed of simple sugars, comprising roughly 70-80% of its dry weight. Fructose and glucose dominate, accounting for approximately 85% of these sugars.<sup>[7]</sup> Fructose contributes to its sweetness while glucose readily provides energy.<sup>[8]</sup>



- **Prebiotics:** Non-digestible carbohydrates like oligosaccharides and inulin constitute about 5-10% of honey, promoting gut health by acting as prebiotics and nourishing beneficial gut bacteria.<sup>[9]</sup>
- **Amino Acids:** Honey harbours a diverse array of amino acids, essential for protein synthesis and various metabolic processes, contributing to 0.5-2% of its dry weight.<sup>[10]</sup>
- **Vitamins and Minerals:** Trace amounts of vitamins B1, B2, B3, B5, B6, C, and K, along with minerals like iron, potassium, calcium, magnesium, and phosphorus, provide additional nutritional value.<sup>[7]</sup>
- **Antioxidants:** Phenolic acids and flavonoids act as potent antioxidants, contributing to honey's anti-inflammatory properties and free radical scavenging abilities.<sup>[11]</sup>

**Properties according modern science:** Scientific research has revealed a range of beneficial properties in honey. These include its ability to fight infection (antiseptic, antimicrobial), reduce inflammation (anti-inflammatory), promote relaxation (sedative), gently stimulate digestion (mild laxative), aid in wound healing (healing), and cleanse (cleansing).

**Properties of mature and immature honey in Ayurveda:** Aged honey balances the three Doshas, while fresh honey, with its sour bite, disturbs the *tridosha*'s.<sup>[12]</sup>

**Properties of fresh and old honey in Ayurveda:** Fresh honey nourishes the body and acts as a laxative, but does little to balance *Kapha*. Aged honey, stored for at least a year, tackles obesity and constipation while promoting tissue regeneration.<sup>[13]</sup>

### Characters of *Madhu* (honey) as per Ayurveda, (14-20)

	<i>Charak Samhita sutrasthan 27/245</i>	<i>Sushruta Samhita sutrasthan 45/132</i>	<i>Ashtang Sangraha sutrasthan 6/92, 95</i>	<i>Ashtang Hridya sutrasthan 5/52</i>	<i>Madanpal Nighantu Ikshukadi varga 9/25-27</i>	<i>Kaidev Nighantu Aushdahi varga/175-178</i>	<i>BhavPraksh Nighantu Madhu varga/2-5</i>
<b>Rasa</b>	<i>Madhura, Kashaya</i>	<i>Madhura</i>	<i>Madhura, Kashya</i>	<i>Madhura, Kashya</i>	-	<i>Madhura</i>	<i>Madhura</i>
<b>Anurasa</b>	-	<i>Kashaya</i>	-	-	-	<i>Kashaya</i>	<i>Kashaya</i>
<b>Guna</b>	<i>Guru, Ruksha</i>	<i>Laghu, Ruksha, Picchila</i>	<i>Guru, Ruksha</i>	<i>Ruksha</i>	<i>Laghu, Ruksha, Vishad</i>	<i>Laghu, Ruksha, Vishad, Sukshma</i>	<i>Laghu, Ruksha, Vishad, Sukshma</i>
<b>Virya</b>	<i>sheeta</i>	<i>sheeta</i>	<i>sheeta</i>	-	<i>sheeta</i>	<i>sheeta</i>	<i>sheeta</i>
<b>Vipaka</b>	-	-	<i>katu</i>	-	-	-	-
<b>Doshagnata</b>	<i>Vatakarak, Kaphapitta nashak</i>	<i>Tridosha nashak</i>	<i>Vatakarak, Kaphapitta nashak</i>	<i>Vatakarak, Kaphapitta nashak</i>	<i>Alpavatalam, Kaphapitta nashak</i>	<i>Vatakarak, Kaphapitta nashak</i>	<i>Alpavatlam, Kaphapitta nashak</i>

### Precautions Before Consuming Honey

- **Dose-dependent effects:** While honey offers various benefits, excessive consumption can be detrimental due to its inherent heavy, rough, astringent, and cold properties. Overindulgence can lead to "*Madhvama*", a severe honey-induced indigestion with unique challenges in treatment. Its severity stems from requiring contrasting interventions compared to other forms of indigestion, potentially leading to rapid and critical complications.<sup>[21]</sup>
- **Thermal sensitivity:** To preserve honey's beneficial properties and avoid potential negative interactions, avoid heating it, consuming it with hot foods, or engaging in strenuous activities or hot environments that raise your internal temperature. Honey originates from various plants, including some with potentially toxic or "*Ushna*" (hot) characteristics. While these toxins are typically harmless in moderate amounts, heating or combining honey with hot substances or environments may exacerbate their potency, leading to *Dosha* imbalances.<sup>[21, 22]</sup>
- Enzymes such as invertase and diastase are destroyed. (These enzymes help in the digestion and breakdown of sugar.) Glucose oxidase available in honey is also lost

through heating.(This enzyme helps the body fight bacteria and viruses by producing hydrogen peroxide which acts as a disinfectant).<sup>[23]</sup>

- **Loss of antioxidant properties** – honey is rich in antioxidants that help neutralize the effect of harmful radicals in the body. These free radicals are the sole cause of chronic diseases and infections.
  - One of the antioxidants found in honey is polyphenols which is an anticancer agent. These substances also help prevent inflammation. Heat destroys this substance.
  - Because of heating there will be formation of HMF (5-hydroxymethylfurfural), this is in excessive quantity has shown Cytotoxicity, genotoxicity, mutagenicity, enzyme inhibition on human body.<sup>[23]</sup>
- **Incompatible with Hot Water:** Due to its inherent coolness, softness, and diverse plant-derived composition, honey exhibits incompatibility with hot substances like water.<sup>[24]</sup> This incompatibility has been corroborated by scientific studies demonstrating that heating honey, particularly above 140°C, reduces its specific gravity and increases ash value, pH, HMF (hydroxymethyl furfuraldehyde) content, browning, phenolics, and antioxidant activity.



- **Mixing with Ghee and Water:** Research suggests that combining honey in equal quantities with water or ghee, while altering certain properties like browning and antioxidants, does not significantly impact food consumption or organ weight in rats. However, a crucial warning emerges in the case of heating honey over 140°C and then mixing it with ghee. This combination leads to enhanced HMF production, a compound with potential long-term deleterious effects and possible toxicity. [25]
- **Avoid Rainwater and Lotus Seed:** Traditional practices advise against consuming honey with rainwater or lotus seed. While the scientific basis for these recommendations requires further investigation, it serves as a reminder of

potential interactions between honey and other substances. [26]

- **Infant Safety and Botulism Risk** [7]: A critical public health concern regarding honey consumption is its potential association with infantile botulism. Honey can harbour dormant spores of the bacterium *Clostridium botulinum*, which are harmless to adults but pose a significant threat to infants. These spores can convert into toxin-producing bacteria within the immature intestinal tract of infants, leading to severe illness and even death. This underscores the importance of avoiding honey consumption in infants under 12 months of age.

TEMPERATURE	EFFECT
Heating up to 37°C (98.6 F)	Loss of nearly 200 components, part of which are antibacterial
Heating up to 40°C (104 F)	Destroys invertase, an important enzyme
Heating up to 50°C (122 F) for more than 48 hrs.	Turns the honey into caramel (the most valuable honey sugars become analogous to sugar)
Heating honey higher than 140 degrees F for more than 2 hours	Causes rapid degradation
Heating honey higher than 160 for any time period	Causes rapid degradation and caramelization
Generally, any larger temperature fluctuation (10°C is ideal for preservation of ripe honey)	Causes decay

**Quality of Market Honey-** Honey adulteration is a major problem causing market losses and hurting the reputation of this valuable product. Studies show that adulterating honey with sugars like cane sugar or corn syrup can have serious health consequences, leading to kidney and liver damage, diabetes, and other chronic illnesses. While scientists have developed methods to detect these adulterants in labs, there's a lack of quick, accessible tests for consumers to protect themselves. Authorities need to take stricter measures to stop the production and sale of adulterated honey, ensuring both food safety and the ecological sustainability of this precious resource. [27]

## DISCUSSION

Honey, revered for centuries as both a delicious treat and a potent remedy, harbours a hidden "trap" when exposed to heat. While modern science and Ayurveda both extol its virtues, they warn against the detrimental effects of exceeding its thermal threshold. From a scientific perspective, heating honey, particularly above 40°C, destroys key enzymes like invertase and diastase, hindering our sugar digestion. Additionally, it diminishes its antioxidant power and potentially releases harmful compounds like HMF, raising concerns about long-term health impacts. Ayurveda echoes these concerns, emphasizing the delicate balance of honey's properties. Fresh honey, with its sour notes, can disturb the *Doshas*, while aged honey, stored for at least a year, promotes balance and healing. However, heating disrupts this balance, exacerbating honey's "Ushna" (hot) characteristics and potentially leading to imbalances and indigestion. The incompatibility with hot substances like water further underscores the fragility of honey's essence. Studies show that heating beyond 140°C, especially when combined with ghee, significantly increases HMF production, raising concerns about potential toxicity.

Beyond heat, other factors like adulteration pose threats. Studies warn of added sugars like cane syrup, jeopardizing honey's genuineness and potentially causing health problems like diabetes and kidney issues.

## CONCLUSION

While, honey undeniably possesses remarkable health benefits, its journey from hive to human requires prudence. We must recognize its sensitivity to heat, avoid exposure to high temperatures, and be mindful of potential adulteration. By respecting its delicate nature, we can unlock the true potential of this golden nectar, ensuring its health-promoting powers continue to grace our lives for generations to come.

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