

Natural Honey, the Golden Nectar: Insight from Scriptures and Food Sciences

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ABSTRACT

Honey, often referred to as “liquid gold,” has captivated humanity for millennia, serving as a completely natural food devoid of additives and preservatives, significant medicinal value and a symbol of cultural and spiritual significance. With over 300 varieties recognized globally, honey’s composition, flavor, and therapeutic properties vary significantly based on its botanical and geographical origins.

Historically, honey has been revered by ancient cultures, from its symbolic role in Egyptian, Greek, and Indian traditions to its central place in Christianity, Islam, Hinduism and Judaism. Its mention in holy texts emphasizes its sanctity and wholesome potential. Scientifically, honey is a complex supersaturated solution containing sugars, amino acids, vitamins, and antioxidants, with demonstrated antimicrobial, anti-inflammatory, and anticancer properties. Modern research highlights its prebiotic activity, cardiovascular benefits, and role in managing diabetes and promoting wound healing.

Despite its remarkable medicinal value, honey is classified as food rather than a drug by regulatory authorities, underscoring the need for further research to standardize its therapeutic use. This manuscript explores the multifaceted nature of honey, examining its historical, religious, nutritional, and medicinal roles across civilizations.

Keywords: Honey, Golden Nectar, Apiculture, Apitherapy, Cultural Significance, Religious Significance.

INTRODUCTION

“As scientific research tools become more and more sophisticated, more precise, and more efficient, honey is further studied, more carefully, more precisely, and more complex and the new generations receive new evidence that the ancient wisdom is valid and authentic.”
[1]

Honey, a completely natural food devoid of additives and preservatives, has a long and esteemed history. The Codex Standards for Honey, as defined by Codex Alimentarius, describe honey as: *“the natural sweet substance produced by honey bees from the nectar of plants or from secretions of living parts of plants or excretions of plant-sucking insects on the living parts of plants, which the bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store, and leave in*

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the honeycomb to ripen and mature.” [2]. The two main types of honey are:

- i. Blossom Honey or Nectar Honey: Derived from the nectar of plants.
- ii. Honeydew Honey: Primarily obtained from the excretions of plant-sucking insects (Hemiptera) on living parts of plants or from secretions of the plants themselves [2].

Honey, the only natural product derived from insects, holds significant nutritional, cosmetic, therapeutic, and industrial value. The term “Nectar” in Greek translates to “victory over death,” while “Ambrosia,” often used interchangeably with nectar, signifies “immortality.” In Latin, “Nectar” means “the drink of the gods.” In Homer’s *Iliad* and *Odyssey*, it has been mentioned that the 12 Olympian gods subsisted on honey (nectar) and honey wine (ambrosia). Aphrodite, the Greek goddess of love and beauty, was known to use honey and beeswax in her beauty treatments.

As the earliest known natural sweetener, honey has been a vital food source for humans since ancient times [3]. In 2022, the global annual production of honey was approximately 1.83 million metric tons [4]. More than 300 types of honey are recognized globally, with substantial variation in composition, taste, and physical properties influenced by factors such as season, nectar origin, production methods, bee species, flora, geography, and climate [5].

Honey contains about 181 different substances, some of which are unique to honey [6]. It is a supersaturated sugar solution that also includes amino acids, proteins, enzymes, essential minerals, vitamins, and various phytochemical [7]. Beyond honey, bees produce other high-quality products such as royal jelly, pollen, beeswax, propolis, and bee venom. Apitherapy (treatment with bee products) has developed fast at a global scale [8].

Bee venom is a secretion produced by *Apis mellifera L* females and is their specialized defense mechanism for colony protection [9]. It is a complex mixture of natural compounds, comprises peptides, enzymes, biologically active amines, and non-peptide components. In Veterinary Medicine, it has demonstrated properties including anti-inflammatory, antioxidant, central nervous system inhibiting, radio-protective, antibacterial, antiviral, and anti-fungal [10]. However, its application involves a risk for the human for fear of unfavorable effects [9]. Of note, purified bee venom used for immunotherapy against reactions to bee stings, is an FDA-approved product.

Objective: The objective of this article is to shed light on honey’s enduring legacy and its vital contributions to human health, culture, and spirituality.

Fascinating Historic Accounts

“No creature has provided man with so much wholesome food as the honeybee” [11]

Fossils of honeybees date back approximately 150 million years, while cave paintings from around 7,000 BCE were discovered in the Cuevas de la Araña of Valencia, Spain. These paintings depict a human figure (the “Man of Bicorn”) climbing vines to collect honey directly from a hive [12]. The earliest known record of apiculture, the science and art of raising honeybees, dates back to the ancient Egyptians around 3,500 BCE [13]. The wall paintings from 8000-9000 BCE in Catalhoyuk (Turkiye) depict that honey was known in Anatolia as an important part of nutrition [8].

The development of beekeeping is linked to the realization that honeybees produce significantly more honey than they need to sustain their hives, allowing humans to safely harvest surplus honey if hives are properly managed [14]. The hard work, done by bees, is remarkable. According to the Food and Agriculture Organization of the United Nations (FAO), “one million flowers and 50,000 bee flights are needed to produce 1 Kg Honey” [15].

Pollination is a fundamental process for the survival of our ecosystems. According to United Nations “nearly 90% of the world’s wild flowering plant species depend, entirely, or at least in part, on animal pollination, along with more than 75% of the world’s food crops and 35% of global agricultural land. Not only do pollinators contribute directly to food security, but they are key to conserving biodiversity” [15].

Honeybee is the most significant pollinator of flowering plants. Whereas this relationship began ca. 120 million years ago, there is uncertainty of how and when?” [16]. Thanks to Johann Goethe (1749-1832) for his understanding: “The flowers are full of honey, but only the bee finds out the sweetness”.

To raise awareness of the importance of pollinators, the threats they face and their contribution to sustainable development, the UN designated 20 May as World Bee Day [15]. According to The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (**IPBES**), the western honeybees are the most widespread managed pollinator globally, and more than 80 million hives produce an estimated 1.6 million tonnes of honey annually [17].

Remarkably, honey’s airtight properties led to its use in preserving the dead [18]. In antiquity, honey was also used in hot burials in the ancient cemetery of Athens—children were buried in two beehives [19]. When Alexander the Great died in 323 BCE, his body was transported over 1,800 miles, from Babylon to Macedonia, submerged in a vat of honey [20]. Similarly, Herod the Great (40–4 BCE), the

Roman Jewish King of Judea executed his wife Marianne but, overcome with regret, preserved her body in honey for seven years [21]. It might be difficult to believe all this but the modern scientific research, employing advanced techniques such as gas chromatography, mass spectrometry, thin-layer chromatography, infrared spectroscopy, and x-ray fluorescence, has confirmed the historical use of beeswax in mummification, particularly from the 5th century BCE onward [20].

The following is a brief description of certain cultural practices related to honey and bees:

Ancient Greek Mythology

Honey has long been a symbol of fertility, happiness, well-being, and inspiration, while the bee, a mysterious insect, has represented colonization, prosperity, and abundance over the centuries. The ancient Greeks regarded honey as a divine gift, with bees and honey playing prominent roles in their mythology, customs, and traditions.

Several gods in Greek mythology were associated with bees. The honeybee, a sacred symbol of Artemis, appeared on Ephesian coins for nearly six centuries. Ambrosia, often referred to as the nectar of the gods, is sometimes described as a form of honey. Bees were linked to both life and death. Melisseus, the god of honey and bees, had daughters, Ida and Adrasteia, who nourished the infant Zeus with milk and honey when his mother hid him from Cronus, the god of time.

The Muses (Ancient Greek: Μοῦσαι, romanized: Moûsai; Greek: Μούσες, romanized: Múses), the inspirational goddesses of art, wisdom, love, and poetry, were closely associated with bees. Bees, called “birds of the Muses,” were believed to drop honey onto the lips of humans, granting them artistic and oratory abilities.

Ancient Egyptian Mythology

In Egyptian society, the honeybee served as a royal symbol between 3000 BCE and 350 BCE. It represented life, birth, death, and resurrection. Honey also played a sacred role in guiding the dead to the afterlife. Ancient Egyptians believed that honeybees originated from the tears of Ra, the sun god. When Ra’s tears fell to the earth, they transformed into bees. Common offerings to the dead included bees, beehives, and bee relics. Honey, present in Egypt during the time of the pharaohs, was used to sweeten food, as shown by Egyptian papyri dating back more than 4,500 years.

Ancient Chinese Mythology

In ancient China, honey was revered as a sacred energy and referred to as “liquid gold.” Its use spans medicinal, religious, and cultural practices. The Shen Nong Ben Cao Jing, one of

the oldest Chinese herbology texts, highlights honey’s role in traditional Chinese medicine. It aligns with the Earth element and primarily influences the stomach and spleen. Honey is also characterized as having a Yang nature, working on the Triple Heater Meridian (Shaoyang).

Ancient Celtic Mythology

The term “Celtic” generally refers to the languages and cultures of Celtic nations, including Ireland, Scotland, Wales, Cornwall, the Isle of Man, and Brittany. In Celtic mythology, honeybees were considered to possess immense wisdom. Like the Egyptians, the Celts believed that honeybees traveled between worlds, bringing divine messages.

Religious History of Honey

“Sacred passages about bees in all the worlds’ major religions highlight their significance to human societies over millennia.” [17].

Honey, recognized as a nutritious and beneficial liquid, is mentioned in all holy books and widely accepted across generations and cultures. It is revered in Christian, Jewish, Muslim, Hindu, and Buddhist traditions.

Significance of Honey in Christianity

In the Bible, honey symbolizes wealth and prosperity and is mentioned 61 times and in most cases, it represents one of three things:

a) God’s Law and Word

As described in Psalm “The law of your mouth is better to me than thousands of gold and silver pieces [Psalm 119:72]. Therefore, I love your commandments above gold, above fine gold [Psalm 119:127]”. David says the rules of the Lord that warn and guide us are “sweeter also than honey, than drippings of the honeycomb” [Psalm 19:10]. As beautifully explained by Andrew Wilson the Word of God is rich, tasty, satisfying, and enjoyable. It brightens the eyes and enlivens the soul. It doesn’t need any flavorings or preservatives to make it taste better, and you cannot add to it or take away from it. It lasts through the centuries and never goes out of date.

b) God’s Land and Rescue

Israelites who had faced slavery and bondage for long time were getting redemption from captivity into freedom and blessed with rescue into sweetness and abundance. The miseries they faced were changed to sweetness as reward.

“A land flowing with milk and honey” [Exodus 3:8] signifies God’s love and generosity toward His people [Leviticus 20:24] and fulfills His promise to their ancestors [Jeremiah 11:5].

c) God's Gifts and Grace

Honey represents God's gifts and grace. It metaphorically represents abundance [Joel 3:18] and is associated with God's blessings, love, strength, and wisdom.

Saint Francis de Sales (1567–1622), Bishop of Geneva, highlighted the honeybee's gentle approach as a metaphor for harmonious living: *"The bee collects honey from flowers in such a way as to do the least damage or destruction to them, and he leaves them whole, undamaged and fresh, just as he found them"*.

Significance of Honey in Judaism

In Jewish tradition, honey is integral to Rosh Hashanah, the New Year celebration. Honey-dipped apple slices symbolize a sweet year ahead. Honey also connects to "Manna," the divine sustenance provided during the Israelites' 40-year journey in the desert, described in the Torah as "like honey wafers" or "a pastry fried in honey."

Significance of Honey in Islam

Honey is mentioned twice in Holy Quran. The first reference describes honey as one of the products of bees {16:68-69}, while the second refers to the PURE honey of paradise, which humans have not yet tasted {47:15}.

Sura Al-Nahl {16:68-69} states: *"And your Lord inspired the bee."* This verse highlights God's revelation to the bee, interpreted as instinctual guidance. The divine address to the bee emphasizes its unique and exceptional status among insects. Through bees, God imparts wisdom and benefits to humanity, demonstrating their diligence, purpose, and courage to live their lives in pursuit of their role.

Bees collect nectar from flowers with minimal harm, ensuring they do not take nectar from flowers already visited by other bees, demonstrating their non-greedy and balanced nature. This process reflects God's power and mercy in the creation of honey, which possesses remarkable healing properties. It serves as a reminder for humans to live harmoniously, maintaining a good social and environmental lifestyle while benefiting others, much like bees do.

Sura Muhammad {47:15} underscores the sacred value of honey in the afterlife, where it is mentioned as a gift of paradise reserved for the righteous who wholeheartedly believe in and submit to God Almighty.

Significance of Honey in Hinduism

Bhramari (Sanskrit: Bhramari, romanized: *Bhrāmarī*, lit. 'like a bee') is the Hindu goddess of bees. The name *Madhava* (or *Mdhava*), meaning "the nectar-born ones," has the bee

as its emblem and is one of the principal names of the gods Vishnu and Krishna. Additionally, the deity of love, Kama, is associated with a beeswax bowstring.

Honey, described as "sweet and healing food," is one of "The Five Nectars of Immortality" (*Panchamrita*), alongside milk, ghee, buttermilk, and sugar. It is considered sacred and often offered as a symbol of devotion to the gods. Honey also plays a significant role in Ayurvedic rituals and is frequently used in purification ceremonies.

In the "Madhu Abhisheka" ritual, honey is poured on deities in temples. During the birth of a child, the "Jatakarma" ceremony is performed to welcome the newborn into the family. A few drops of honey, referred to as "one of nature's most amazing gifts to humanity," are placed in the child's mouth while whispering the name of God into their ear.

In Hinduism, honey (*Madhu*), as food, holds specific religious significance. Its medicinal and nutritional values are highlighted in the Vedas. The Rigveda (1:9:6–8) contains the following verses about honey: *"This herb, born of honey, dripped in honey, sweetened by honey, is the remedy for all injuries. Let every wind that blows drop honey; let the rivers and streams recreate honey; let all our medicines turn into honey; let the dawn and the evening be full of honey; our nourisher, this sky above, be full of honey; let our trees be honey; let the sun be honey, let our cows secrete honey."*

An insightful message from the *Srimad Mahabhagavatam* states: *"Like a honeybee gathering honey from all types of flowers, the wise men search everywhere for truth and see only good in all religions."*

Significance of Honey in Buddhism

In Buddhist tradition, honey is mentioned in several sutras for its purifying qualities. Buddha himself subsisted on honey and milk during his fasting period before enlightenment. A notable legend tells of a monkey offering Buddha a beehive filled with honey, later celebrated as Madhu Purnima (honey full moon). On this day, Buddhists commemorate the act by giving honey to monks.

Buddha's wisdom highlights the bee's gentle nature: *"As a bee gathers honey from the flower without injuring its color or fragrance, even so the sage goes on his alms-round in the village."*

Significance of Honey in Sikhism

Honey features in certain Sikh ceremonies, such as the Khalsa birth ritual. In this ceremony, honey is added to water, stirred with a Karpan (dagger), and given to the child after prayers.

Honey as Food

“Honey is considered a nutritious, healthy, and natural food, whose composition is highly variable depending on its botanical and geographical origin.” [22].

Natural honey has been widely accepted as both food and medicine across all generations, traditions, and civilizations, ancient and modern [23]. Whereas, in our present setup, every edible is treated, sterilized, cooked, or pasteurized and then combined with some other stuff to make it more palatable, honey is almost unique in having no need for additives, flavorings, or preservatives. It lasts through the centuries, never going out of date. Bacterial growth is limited in honey due to certain chemical properties, such as low water content and high acidity (pH 3.9).

The integration of honey into the human diet can be traced back to the Stone Age, which began approximately 2.6 million years ago [24]. Honey is a supersaturated solution of sugars, primarily composed of fructose (38%) and glucose (31%), and also contains minerals, proteins, free amino acids, enzymes, vitamins, and polyphenols [25]. Although it is high in carbohydrates, honey's glycemic index ranges significantly from 32 to 85, depending on its botanical source [26].

There is long continuing debate for generations: “whether honey is a better sweetener than refined sugar? What is the healthier choice?” Scientifically, in addition to its known nutrients the honey has demonstrated antimicrobial, anti-inflammatory, and anticancer properties. Modern research highlights its prebiotic activity, cardiovascular benefits, and role in managing diabetes and promoting wound healing. The primary advantages of honey over refined sugar include its lower calorie content, lower glycemic impact, and numerous long-term health benefits, making it a healthier alternative to refined sugar in many diets. Honey and refined sugar are both made up of a combination of glucose and fructose but there are some differences. Whereas in refined sugar (coming from sugar beets or sugar cane) glucose and fructose are bound together to form sucrose, in honey (with around 25 different oligosaccharides) they are primarily independent of each other. Regarding digestibility of honey, honey is different from refined sugar because of the added enzymes by bees that divide the sucrose into two simple sugars, fructose and glucose. These sugars are directly absorbed by our bodies and are easier to digest.

The following terms require clarification:

Probiotics: Foods or supplements that contain live microorganisms intended to maintain or improve the “good” bacteria (normal microflora) in the body.

Prebiotics: Foods, typically high in fiber, that act as nourishment for human microflora.

There is growing evidence that certain types of honey show prebiotic activity. Probiotics include compounds such as oligofructose and inulin (naturally occurring indigestible carbohydrates), which promote favorable changes in the composition and function of gut microbiota [27]. Dietary prebiotics have been associated with many health benefits, including immunostimulant, improved digestion and nutrient absorption, vitamin synthesis, cholesterol reduction, alleviation of gas and bloating, regulation of pathogenic growth, enhanced mineral absorption (particularly calcium), modulation of lipid metabolism via fermentation products, anti-inflammatory properties, and a reduced risk of cancer and cardiovascular disease [28]. It is known that disturbances in the balance of gut microbiota are linked to gut inflammation and the development or progression of various health conditions, including enteropathogenic infections, obesity, and mental health disorders. Whereas the diet is a major factor driving the composition and metabolism of the colonic microbiota [29], honeybee gut microbiota is a complex ecosystem that plays a vital role in colon health and provides defense against diseases [30].

Medicinal Value of Honey

“The benefit of honey is undeniable and can be explored from different angles: scientific or spiritual, food or medicine, resource or elixir, inspiration or delight.” [1].

The concept of using honey as a medicine date back at least six thousand years [31]. The first written reference to honey appears on a Sumerian tablet from 2100–2000 BCE, which mentions its use as a drug and ointment [32]. According to the Smith Papyrus (1700 BCE) and Ebers Papyrus (1550 BCE), honey was one of the most frequently used remedies in ancient Egyptian medicine, employed for both external and internal applications. It was also a common ingredient in Greek, Indian, Roman, and Arab medicine systems.

Hippocrates (466–377 BCE) praised the healing properties of honey, noting that it *“cleans sores and ulcers, softens hard ulcers of the lips, heals carbuncles and running sores.”* He recommended various honey mixtures for various ailments such as “Oxymel” (honey with vinegar) for pain, “Oenomel” (honey with grape juice) for gout and neurological disorders, and “Hydromel” (honey with water) for thirst and fever [33]. Pythagoras (c. 570–c. 495 BCE), known as the “Father of Philosophy,” and Democritus (c. 460–c. 370 BCE), the “Laughing Philosopher,” also extolled honey for its beneficial properties, recognizing its role in promoting well-being, vitality, and longevity. Greek philosopher Aristotle (384–322 BCE), referred to as “The First Teacher,” authored the first known book on beekeeping. Much of the scientific understanding of bees and their biology originates from Aristotle's works: *“The Stories About Animals and About*

Animals of Genesis." Honey also played a role in the ancient Olympic Games, beginning in 776 BCE in Olympia, Greece, where athletes consumed honey water as a natural energy booster during major athletic events [32]. The *Odyssey* (c 750–650 BCE), attributed to Homer, mentions "Melikraton," a mixture of honey and milk. Dioscorides (c. 40–c. 90 CE), author of *De Materia Medica*, described honey as effective for treating ulcers, sunburn, coughs, and inflammation of the throat and tonsils.

In Ayurvedic medicine (the "science of life") and Yunani medicine (traditional healing based on Greek doctrines refined by Muslim physicians notably Ibn Sina), honey was a prominent remedy for balancing bodily stress and promoting healing. Honey is a valuable hematinic substance, as its iron, copper, and manganese contents help keep proper hemoglobin and red blood cell levels. Its demulcent properties calm mucous membranes in the upper respiratory tract, making it a soothing ingredient in cough syrups.

Modern medicine explores honey's therapeutic potential by examining oxidative stress, antioxidant activity, and inflammation. Oxidative stress, caused by an imbalance between oxidants and antioxidants, leads to cellular damage and is associated with inflammation and various lifestyle-related diseases [34]. Dietary antioxidants can counteract the effects of free radicals and reduce oxidative stress [35]. Honey, rich in phenolic compounds (flavonoids and phenolic acids), exhibits high antioxidant and anti-inflammatory properties, which confer antimicrobial, antiviral, anti-fungal, anticancer, and anti-diabetic benefits [36]. Honey has been found to exhibit the same potency to prevent growth of low as well as high size of inoculum (10- fold) of the isolates [37]. The phenolic compounds also prevent free radical damage, inhibit lipid peroxidation, and contribute to chemopreventive activity in carcinogenesis by inducing apoptosis [25]. Apoptosis, a programmed cell death process, eliminates damaged cells, and honey is considered an effective apoptosis inducer.

Clinical studies have shown its benefits in treating infantile gastroenteritis by reducing diarrhea duration and aiding post-gastroenteritis hydration recovery. A study at the University of Natal Teaching Hospital in Durban, South Africa, showed that honey in oral rehydration solution shortened bacterial diarrhea duration without prolonging non-bacterial diarrhea. Honey could safely replace glucose in electrolyte solutions [38].

Honey's anti-fungal properties make it a promising alternative for *Candida*-associated infections, particularly for topical applications on skin and mucous membranes [39]. Notably, honey does not induce resistance, unlike many antibiotics and antifungals [40]. A clinical trial on

vulvovaginal candidiasis documented reduced inflammation, discharge, and itching after eight days of treatment with a 70% Iranian honey cream [41].

Honey also demonstrates cardioprotective effects, reducing risk factors for cardiovascular disease by inhibiting inflammation and improving endothelial function [42]. Studies show that regular intake of phenolic compounds, such as those found in honey, is associated with reduced cardiovascular risk [43]. Honey enhances low-density lipoprotein (LDL) resistance to oxidation and contributes to coronary vasodilation, anti-thrombotic effects, and antioxidant activity [44,25]. These properties make honey a powerful tool against atherosclerotic plaque formation and related cardiac disorders. Its anti-diabetic effects are also noteworthy. Honey consumption results in a lower postprandial glycemic response compared to other sweeteners, making it preferable for diabetic patients. Studies confirm that honey reduces glucose serum concentrations in individuals with type 1 and type 2 diabetes [45].

Honey is the oldest known wound-healing agent, with the first written reference appearing on a Sumerian tablet dating back to 2100–2000 BCE. Hippocrates and Dioscorides (see above) further observed its therapeutic use. Modern medicine has rediscovered honey's effectiveness in treating surface wounds, bedsores, ulcers, and burns. Honey's proven abilities to sterilize wounds, stimulate tissue regrowth, and reduce edema and scar formation have made it a valuable therapeutic option. A prospective randomized clinical study conducted at a Nigerian university teaching hospital compared the healing of abscess wounds treated with either crude undiluted honey or Edinburgh University Solution of Lime (EUSOL). Wounds treated with honey healed significantly faster, leading to shorter hospital stays compared to those treated with EUSOL [46]. Another study at the University Teaching Hospital in Calabar, Nigeria, examined 59 patients with wounds and ulcers, 80% of which had failed to respond to conventional treatments. After being treated with unprocessed honey, 58 cases (98.3%) showed remarkable improvement. The only non-responder was later diagnosed with Buruli ulcer, caused by *Mycobacterium ulcerans*. Sterile wounds remained sterile until healed, while infected wounds and ulcers became sterile within one week of honey application. Rapid debridement replaced sloughs with granulation tissue, promoting epithelialization and reducing edema around the ulcer margins [47].

Oral mucositis, a debilitating complication of cancer treatments such as chemotherapy and radiotherapy, presents with pain, nutritional difficulties, and heightened infection risk due to open sores in the mucosa. A four-week study using a mouthwash solution made with natural Baran-

Baghron honey from Iran (1:20, v/v) significantly reduced the severity of mucositis in adult patients with myeloid leukemia undergoing chemotherapy and improved their body weight [48].

Whereas honey has a wide range of antimicrobial activity, most of the studies were on a single microbe. However, a study was conducted at Dubai Specialized Medical Center, UAE on high dose of polymicrobial culture of human pathogens consisting of *Staphylococcus aureus*, *Streptococcus pyogenes*, *Escherichia coli* and *Candida albicans*. Polymicrobial culture was found to affect growth of the isolates and increased their sensitivity to honey [37]. Honey prevented growth of gram positive or gram negative bacteria or *C. albicans*. This property makes honey a good drug to apply when closing surgical wounds or wounds due to various traumas [37].

While honey's antioxidant, anti-inflammatory, antibacterial, and antiviral properties continue to drive interest in its therapeutic use, caution must be exercised in its free use. With over 300 varieties of honey worldwide, variations in composition and dosage across studies make it difficult to attribute specific therapeutic effects to a particular honey type or dose. Moreover, neither the FDA (U.S. Food and Drug Administration) nor the FAO (Food and Agriculture Organization of the United Nations) classify honey as a drug; they grade it as a food.

A Note on Intoxicating and Toxic honeys

"Medicine sometimes grants health, sometimes destroys it, showing which plants are helpful, which do harm."

Publius Ovidius Naso (43 BCE-17 AD) – Roman Poet

Of note, there is a mystifying variety which is different from commercially available honey (described above). It is called Mad honey because of its intoxicating/poisonous effects. Historical accounts of Mad honey stretch back over two millennia. The tales may be traced to the Oracle of Delphi. It is a special type of honey that bees make from flowers of *Rhododendron* species, containing Grayanotoxin, most prevalent in Türkiye and Nepal where it is named "Deli bal honey" and "Bhir mauri", respectively. Its use, as intoxicant, hallucinating agent, aphrodisiac, and biological weapon, has been well recognized.

One of the earliest reports of use of Mad honey, as a biological weapon, came from Xenophon in war of 401BCE, of which he was the Commander. Moreover, Mad honey was used by the King Mithridates VI (nicknamed the "Poisoner King") in 67 BCE against Pompey the Great whose 1,440 soldiers, intoxicated by Mad honey, were slain. Whereas the Mad honey has similar food value as that of other commercially available honey, it is used less as a food and more as a

hallucinogen, recreational drug and an aphrodisiac [49].

Toxic honey production is a significant risk in parts of New Zealand. During investigation of an outbreak, the causative agent was identified as "tutin", which comes from the native plant tutu (*Coriaria arborea*), well known as a potential source of contamination of honey in the warmer areas. The association of CNS stimulation with nausea and vomiting is characteristic clinical feature [50].

Zhang et al reported a series of 31 honey poisoning cases from Southwest China. The most frequent symptoms were gastrointestinal but palpitations, dizziness, chest congestion and dyspnea were also noted in some patients. Severe cases developed oliguria/anuria, twitch, hematuria, ecchymosis or hematochezia (passage of fresh blood per anus, usually in or with stools). Eight patients died (fatality rate: 25.8%). The pollen of *Tripterygium hypoglucum* (a plant with poisonous nectar and pollen) was detected in 75.9% of honey samples [51].

CONCLUSION

"The Bible promises a land of milk and honey. The Koran says paradise has rivers of honey for those who guard against evil. Krishna, the Hindu deity, is often shown with a blue bee on his forehead. The bee itself is considered a symbol of Christ: the sting of justice and the mercy of honey, side by side." [52]"

Honey is a remarkable natural substance with a rich history and significant cultural, medicinal, and nutritional value. Honey, from ancient civilizations to modern times, has been revered for its nutritional benefits, healing properties and symbolic meanings.

It has played a crucial role in various religious and cultural practices, highlighting its importance across different societies. The scientific research on honey continues to uncover its numerous health benefits, including its antioxidant, anti-inflammatory, and antimicrobial properties.

As we move forward, it is essential to recognize and preserve the invaluable contributions of honey and honeybees to our well-being and the environment. By understanding and appreciating the multifaceted nature of honey, we can continue to harness its potential for the betterment of humanity.

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