International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

ELSEVIER
SSRN

IJIEMR Transactions, online available on 25th Nov 2020. Link :http://www.ijiemr.org/downloads.php?vol=Volume-09&issue=ISSUE-12

DOI: 10.48047/IJIEMR/V09/I12/75

Title: CHEMICAL COMPOSITION OF HONEY AND ITS USE IN MEDICINE
Volume 09, Issue 12, Pages: 393-397
Paper Authors

Holmatova Marxabo Axmadaliyevna

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

CHEMICAL COMPOSITION OF HONEY AND ITS USE IN MEDICINE

Holmatova Marxabo Axmadaliyevna
Teacher of the Department of chemistry, Fergana State University

Abstract
Honey is one of the most popular natural sweet substances. From a chemical point of view, it could be defined as a natural food mainly composed of sugars and water together with minor constituent such as minerals, vitamins, amino acids, organic acids, flavonoids and other phenolic compounds and aromatic substances. Its composition is particularly variable, depending on its botanical and geographical origins. The aim of this chapter is to describe the principal elements in compounds present in honey and their use in medicine.
Key words: Honey, honey bee, apiculture, honey composition, food authentication Geographical origin, botanical origin, floral origin.

INTRODUCTION

Honey is a sweet, viscous food substance made by honey bees and some related insects. Bees produce honey from the sugary secretions of plants (floral nectar) or from secretions of other insects (such as honeydew), by regurgitation, enzymatic activity, and water evaporation. Bees store honey in wax structures called honeycombs. The variety of honey produced by honey bees (the genus Apis) is the best-known, due to its worldwide commercial production and human consumption. Honey is collected from wild bee colonies, or from hives of domesticated bees, a practice known as beekeeping or apiculture.Honey gets its sweetness from the monosaccharides fructose and glucose, and has about the same relative sweetness as sucrose (table sugar). It has attractive chemical properties for baking and a distinctive flavor when used as a sweetener. Most microorganisms do not grow in honey, so sealed honey does not spoil, even after thousands of years.

Fifteen millilitres (1 US tablespoon) of honey provides around 190 kilojoules (46 kilocalories) of food energy. Honey use and production have a long and varied history as an ancient activity. Several cave paintings in Cuevas de la Araña in Spain depict humans foraging for honey at least 8,000 years ago.

Botanical and biographical origins of honey are an important issue in food quality and safety. This chapter focuses on use of chemical components to determine botanical and geographical origins of honey. The botanical and geographical origins of the nectar are related with the chemical composition of honey. Honeys can originate from single and multiplant species. In

general, the prices of honeys from single plant species are much higher than those of common polyfloral honeys because of consumer preferences. Single and multiple chemicals and components can well indicate the botanical and geographical origins of the honey. Marker chemicals and components include flavonoids, pollen, aroma compounds, oligosaccharides, trace elements, amino acids, and proteins. If multiple chemicals are used as markers, patterns of the chemicals are often used to detect the botanical and geographical origins of honey. Modern statistical software in combination with advanced analytical instrumentation provides high potential for the differentiation of the botanical and geographical origins of the honey.

Chemical Composition of Honey

It's no small feat-honey is composed of at least 181 components. Its unique taste is a result of complex chemical processes, which is why sugary syrup substitutes just can't compare. They can't mimic Mother Nature's chemical know-how. Last year alone, bees in the United States produced a whopping 158 million pounds of honey. That's a lot of chemistry. Honey is composed mostly of the sugars glucose and fructose. It's what scientists term a supersaturated solution. When sugar is stirred into a glass of water, some sugar is usually left at the bottom. That's because the water (solvent) will only dissolve a certain amount. But, if the water is heated, more sugar can be dissolved. Consequently, in supersaturation, heat, enzymes or other chemical agents can increase the amount of material dissolved. These solutions tend to crystallize easily. Syrup, fudge and honey are all considered to be supersaturated solutions. Because of its supersaturation and low water content (15-18%), honey is viscous. That means it is rather thick in consistency and sometimes it's solid. Its main ingredients are carbohydrates (sugars,) but it also contains, vitamins, minerals, amino acids, enzymes, organic acids, pollen, fragrance and flavor compounds.

Carbohydrates

Unsurprisingly, these comprise the major portion of honey - about 82%. The carbohydrates present are the monosaccharides fructose (38.2%) and glucose (31%); and disaccharides (~9%) sucrose, maltose, isomaltose, maltulose, turanose and kojibiose. There are also some oligosaccharides present (4.2%), including erlose, theanderose and panose, formed from incomplete breakdown of the higher saccharides present in nectar and honeydew.

Proteins and Amino Acids

Honey contains a number of enzymes, including invertase, which converts sucrose to glucose and fructose; amylase, which breaks starch down into smaller units; glucose oxidase, which converts glucose to gluconolactone, which in turn yields gluconic acid and hydrogen peroxide; catalase, which breaks down the peroxide formed by glucose oxidase to

water and oxygen; and acid phosphorylase, which removes inorganic phosphate from organic phosphates.

Honey also contains eighteen free amino acids, of which the most abundant is proline.

Vitamins, Minerals and Antioxidants

Honey contains trace amounts of the B vitamins riboflavin, niacin, folic acid, pantothenic acid and vitamin B6. It also contains ascorbic acid (vitamin C), and the minerals calcium, iron, zinc, potassium, phosphorous, magnesium, selenium, chromium and manganese.

The main group of antioxidants in honey are the flavonoids, of which one, pinocembrin, is unique to honey and bee propolis. Ascorbic acid, catalase and selenium are also antioxidants. Generally speaking, the darker the honey, the greater its antioxidising properties.

Other compounds

Honey also contains organic acids such as acetic, butanoic, formic, citric, succinic, lactic, malic, pyroglutamic and gluconic acids, and a number of aromatic acids. The main acid present is gluconic acid, formed in the breakdown of glucose by glucose oxidase. Honey also contains hydroxymethylfurfural, a natural product of the breakdown of simple sugars below pH 5.

Like any supersaturated solution, honey tends to crystallize. Crystallization occurs when long chains of glucose (polysaccharides) in the honey are broken down. The glucose molecules start sticking to one another usually on a speck of dust or pollen. These glucose crystals then fall to the bottom of the jar. The problem with crystallization is that when the glucose is separated from the honey, the leftover liquid contains a higher percentage of water. Yeast, now with enough water and sugar causes the honey to ferment. That's why honey that crystallizes may ferment more quickly than non-crystallized honey. Temperature can affect crystallization. Honey is best stored above 50ºF. Researchers have also concluded that honey removed from the comb and processed with extractors and pumps is more likely to crystallize than honey left in the comb because of the fine particulate matter introduced for crystals to begin on. Other factors that contribute to crystallization are dust, air bubbles, and pollen in the honey. Crystallization isn't always bad. Creamed (spreadable) honey depends upon controlled crystallization. While natural crystallization creates grainy crystals, controlled crystallization creates a smooth and creamy product.

Heating honey can cause chemical changes, as well. Sometimes, honey darkens due to a process known as the Maillard Reaction. Because honey is slightly acidic with a pH of about four, browning can sometimes occur over time. This is because the amino acids in honey begin reacting with the sugars. Caramelization, the browning of sugar, is caused when heating begins breaking the molecular bonds in the honey. When these bonds are broken and then re-form, caramelized sugar is

the result. Heat can also affect both honey and high-fructose corn syrup. When fructose is heated, HMF (hydroxymethylfurfural) can sometimes form. HMF is deadly to bees. HMF can form at relatively low temperatures (110-115oF.) If honey bees are fed high fructose corn syrup that's been stored or transported in hot conditions, it might kill them.

Heat and crystallization can also affect the color of honey. Crystals in honey will cause it to appear lighter in color. That's why creamed honey is lighter in color. In nature, the color of honey is usually due to the type of flower nectar from which the honey derived. Consequently, honey collected in the Fall will usually differ in color than honey collected in the Spring.

Medical use

Wounds and burns

Honey is a popular folk treatment for burns and other skin injuries. Preliminary evidence suggests that it aids in the healing of partial thickness burns 4–5 days faster than other dressings, and moderate evidence suggests that post-operative infections treated with honey heal faster and with fewer adverse events than with antiseptic and gauze. The evidence for the use of honey in various other wound treatments is of low quality, and firm conclusions cannot be drawn. Evidence does not support the use of honey-based products for the treatment of venous stasis ulcers or ingrown toenail. Several medical-grade honey products have been approved by the FDA for use in treating minor wounds and burns.

Antibiotic

Honey has long been used as a topical antibiotic by practitioners of traditional and herbal medicine. Honey's antibacterial effects were first demonstrated by the Dutch scientist Bernardus Adrianus van Ketel in 1892. Since then, numerous studies have shown that honey has broad-spectrum antibacterial activity against Gram-positive and Gram-negative bacteria, although potency varies widely between different honeys. Due to the proliferation of antibiotic-resistant bacteria in the last few decades, there has been renewed interest in researching the antibacterial properties of honey. Components of honey under preliminary research for potential antibiotic use include methylglyoxal, hydrogen peroxide, and royalisin (also called defensin--1).

Cough

For chronic and acute coughs, a Cochrane review found no strong evidence for or against the use of honey. For treating children, the systematic review concluded with moderate to low evidence that honey probably helps more than no treatment, diphenhydramine, and placebo at giving relief from coughing. Honey does not appear to work better than dextromethorphan at relieving coughing in children. Another reviewer agrees with these conclusions.

The UK Medicines and Healthcare Products Regulatory Agency recommends avoiding giving over-the-

counter cough and common cold medication to children under six, and suggests "a homemade remedy containing honey and lemon is likely to be just as useful and safer to take", but warns that honey should not be given to babies because of the risk of infant botulism. The World Health Organization recommends honey as a treatment for coughs and sore throats, including for children, stating that no reason exists to believe it is less effective than a commercial remedy.

The use of honey has been recommended as a temporary intervention for known or suspected button cell battery ingestions to reduce the risk and severity of injury to the esophagus caused by the battery prior to its removal.

There is no evidence that honey is beneficial for treating cancer, although honey may be useful for controlling side effects of radiation therapy or chemotherapy used to treat cancer.

Consumption is sometimes advocated as a treatment for seasonal allergies due to pollen, but scientific evidence to support the claim is inconclusive. Honey is generally considered ineffective for the treatment of allergic conjunctivitis.

Although the majority of calories in honey is from fructose, honey does not cause increased weight gain and fructose by itself is not an independent factor for weight gain.

REFERENCE:

Krell, R. (1996). Value-added products from beekeeping. Food and Agriculture Organization of the United Nations. p. 5. ISBN 978-92-5-103819-2. Retrieved 5 January 2016.

Root, A. I.; Root, E. R. (2005). The ABC and Xyz of Bee Culture. Kessinger Publishing. ISBN 978-1-4179-2427-1. Retrieved 5 January 2016.

Beekeeping and Sustainable Livelihoods (2004), Food and Agriculture Organization of the United Nations

"Honey" . The New Students Reference Work . 1914