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Review Article

CRITICAL REVIEW ON *MADHU* W.S.R. TO HONEY

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ABSTRACT

Honey is a natural sweet substance produced by honey bees and is one of the most valued as well as appreciated natural substance known to mankind since ancient times. Of all the natural foods rich in carbohydrates honey is the most wholesome and delicious. The medicinal quality, taste, texture, color and aroma of honey differs according to the geographical area and the species of plants from which it has been collected. Honey is called as *Madhu* in *Ayurveda*. Eight types of *Madhu* are described in *Ayurveda* depending on the type of bee which collects it and `*Makshika'* is considered medicinally the best among them. According to biomedical science, the best honey is made by *Apis mellifera*. Etymology, Synonyms, varieties, method of collection, chemical constituents, properties, adulterants, chemical tests, and the usages of honey are gathered from text books, experienced *Ayurvedic* physicians and from internet. In Ayurveda, honey is used for both internal and external applications. It shows mild laxative, bactericidal, sedative, and antiseptic properties and is found to be useful in the treatment of bronchial asthma, tuberculosis, cough and cold, eye diseases, wounds, constipation, hiccups, skin disorders, worm infestation and urinary tract disorders etc. Old honey reduces fat and obesity and is highly scarificant. Honey is much used in the preparation of confections and electuaries and as an adjunct to decoctions, pills and powders. But problem of its adulteration is becoming a common issue in present scenario, so it is always necessary to use genuine honey for attaining desired benefits and reject the spurious and adulterated honey which is sold cheaper in the market. The present work aims at the review of Honey or *Madhu* as is explained in *Ayurveda* & biomedical science.

KEYWORDS: Honey, *Madhu, Makshika, Ayurveda.*

INTRODUCTION

For many centuries, honey has been used in vital alternative medicine of *Ayurveda* and is one among the foods having religious significance. Hindus consider honey as one of the five elixirs of immortality (*Panchamrita*). In temples, honey is poured over the deities in a ritual called *Madhu abhisheka.* The Vedas and other ancient literature describe honey as a great medicinal and health food. In Buddhism, honey plays an important role in the festival of *Madhu Purnima*, celebrated in India & Bangladesh. On *Madhu Purnima*, Buddhists remember this act by giving honey to monks. Prophet Mohammad strongly recommended honey for healing purpose and Quran promotes it as a nutritious and healthy food. [1] It is said that Goliath and Hercules of ancient times and Ramamurthi the great Indian Sandow, were in the habit of taking daily honey in their diet. Hence their might, strength and capacity for work. Not only to those who wish to build up a strong body, but also to those suffering from diabetes, honey is a wholesome food, as those cannot indulge in any kind of sugar.[2]

MATERIALS AND METHODS

Sources of data collection: Details of present study were collected from different *Ayurvedic* and bio-medical lexicon, *Ayurvedic* physicians, articles published in various open journals and from few search engines.

NIRUKTI* (Etymology) of *Madhu*:[3]** The word *Madhu* is said to be derived from **"Manyat iti madhu***"** meaning sweet, delicious and pleasant.

Synonyms of Honey in modern science:[9] Honey, purified honey, clarified honey, strained honey, mel.

Biological sources: Honey is a sugary secretion deposited by the honey bees, *Apis mellifera* linn and other species of *Apis* in the honey comb. It must be free from foreign substances such as parts of insects and leaves, but may contain pollen grains.[9] *Apis cerana, Apis dorsata, Apis mellifera, Apis floria, Apis andreniformis, Apis koschevnikov*, and *Apis laborisa* are some of the varieties of bees that make honey.[10]

Synonyms of *Madhu* (Honey) in *Ayurveda*

Table 1: Synonyms of *Madhu* according to different *Acharyas* [4-8]

Synonyms	*Dhanvantri nighantu Suvarnadi varga 6/213*	*Madanpal nighantu Ikshukadi varga 9/23*	*Kaidev nighantu Aushadhi varga/173*	*Raj nighantu Paniyadi varga/114*	*Bhavaprakash nighantu Madhu varga/1*
Madhu	+	+	+	+	+
Kshaudra	+	-	-	+	+
Makshika	+	+	-	+	+
Madhvika	-	-	-	-	+
Kusumasava	+	-	-	+	-
Pushpasava	+	+	+	+	-
Pushaprasa	+	+	+	+	-
Saragha	+	-	+	-	+
Makshikavanta	-	-	-	-	+
Bhrungavanta	-	-	-	-	+
Vartivanta	-	-	-	-	+
Makshikavita	-	-	+	-	-
Pushparasodbhava	-	-	-	-	+
Pavitra	-	-	-	+	-
Pitrya	-	-	-	+	-

Scientific classification of honey bee:[10] 'Honey bee' belongs to Animal Kingdom, Phylum- Arthropoda, Class- Insecta, Order- Hymenoptera, Family- Apidae, Genus- Apis, Species- millifera, cerana with Binomial name- *Apis mellifera, Apis cerana* etc.

Habitat: Honey is produced mainly in England, West Indies, California, Canada, Chile and in some parts of Africa, Australia and New Zealand.[9] India ranks seven among top 10 honey producing countries in the world. Punjab, Haryana, Uttar Pradesh, Bihar and West Bengal are the major honey producing states in India.[11] North east region and Maharashtra are the key areas for natural honey production. Among Southern states, Tamil Nadu ranks first followed by Kerala and Karnataka in apiculture farming.[12]

Collection:[9] Honey bees live in swarms which are gathered into hives. A hive contains;

1. A single queen bee
2. The males or drones and
3. The worker bees which are undeveloped females.

The Worker bees posses a long hollow tube to insert into the nectaries of the flowers. The tube is formed from the maxillae and labium. They take nectar from the flowers and pass it through the oesophagus into the honey sac or crop. The nectar, which is an aqueous solution of sucrose (25%), mixed with salivary secretion containing the enzyme invertase and is then hydrolyzed into the invert sugar. On returning at the hive, the worker bees deposit the contents of the honey sac in the previously prepared cell of the honey comb. The filled cell is sealed by wax. For collecting the honey, the honey comb is smoked to remove bees, the comb is cut and honey is collected either by drainage or by expression.

Characters: Honey is thick, syrupy, translucent liquid when fresh. The color is pale yellow or reddish –brown and it possesses pleasant odor and sweet taste which is dependent upon the floral source of the product. The honey obtained from *Eucalyptus* and *banksia* species has somewhat unpleasant odor and taste and the honey collected from *Datura stramonium* is poisonous. On storage it becomes opaque and granular due to the crystallization of dextrose.[9] The average pH of honey is 3.9, but ranges from 3.4 to 6.1.[1]

Chemical constituents:[9] It consists chiefly of fructose (40-50%), glucose (30-40%), and small amounts of sucrose (0.1-10%), dextrin, formic acid, volatile oil and pollen grains. In addition to these, traces of enzymes, vitamins, proteins, maltose, melezitose, pentosans, gums, trace elements, amino acids, and coloring matter are also present.

Adulterants:[9] Honey is adulterated with cane sugar, corn syrup and artificial invert sugar which are obtained by acid hydrolysis of sucrose. The sugar contains furfural which gives red color with resorcinol in presence of hydrochloric acid on prolonged heating or storage of the honey; furfural may be formed in the genuine honey.

Chemical tests:[9] Adulteration in honey is determined by the following tests-

- **Fiehe'test for artificial invert sugar:** Honey (10ml) is shaken with petroleum or solvent ether (5ml) for 5-10 minutes. The upper ethereal layer is separated and evaporated in a china dish. On addition of 1% solution of resorcinol in hydrochloric acid (1ml) a transient red color is formed in natural honey while in artificial, the color persists for some time.

- **Reduction of Fehling's solution:** To an aqueous solution of honey (2ml) Fehling solutions 1 & 2 are added and the reaction mixture is heated on steam bath for 5-10 minutes' brick red color is produced due to the presence of reducing sugars.

Properties of *Madhu* (Honey) in *Ayurveda*: This is one of the best *Yogvahi* substance i.e. without changing its own properties, honey carries the effects of the drugs added to it. It means it enhances the properties and actions of the substances with which it combines.[13]

Table 2: Properties of *Madhu* according to different *Acharyas*[14-20]

	Charak Samhita sutrasthan 27/245	***Sushruta Samhita sutrasthan 45/132***	***Ashtang Sangraha sutrasthan 6/92, 95***	***Ashtang Hridya sutrasthan 5/52***	***Madanpal Nighantu Ikshukadi varga 9/25-27***	***Kaidev Nighantu Aushdahi varga/175-178***	***BhavPraksh Nighantu Madhu varga/2-5***
Rasa	*Madhura, Kashaya*	*Madhura*	*Madhura, Kashya*	*Madhura, Kashya*	-	*Madhura*	*Madhura*
Anurasa	-	*Kashaya*	-	-	-	*Kashaya*	*Kashaya*
Guna	*Guru, Ruksha*	*Laghu, Ruksha, Picchila*	*Guru, Ruksha*	*Ruksha*	*Laghu, Ruksha, Vishad*	*Laghu, Ruksha, Vishad, Sukshma*	*Laghu, Ruksha, Vishad, Sukshma*
Virya	*Sheeta*	*Sheeta*	*Sheeta*	-	*Sheeta*	*Sheeta*	*Sheeta*
Vipaka	-	-	*Katu*	-	-	-	-
Dosghanta	*Vat karak, Kaph pitta nashak*	*Tridosh nashak*	*Vat karak, Kaph pitta nashak*	*Vat karak, Kaph pitta nashak*	*Alpa vatlam, Kaph pitta nashak*	*Vat karak, Kaph pitta nashak*	*Alpa vatlam, Kaph pitta nashak*

Properties according to modern science:[9] Various experiments and studies on honey have shown that it posses antiseptic, antimicrobial, anti-inflammatory, sedative, mild laxative, healing and cleansing properties.

Properties of mature and immature honey in *Ayurveda*: Mature honey mitigates all three *Doshas* while immature (fresh raw) honey aggravates the three *Doshas* and is sour in taste. [21]

Properties of fresh and old honey in *Ayurveda*: Fresh honey has *Bringhana guna* (nourishing the body), does not mitigate *Sleshma (kapha*) very much and is a laxative. Old honey (stored for at least 1 year) reduces fat and obesity, is constipating and highly scarificant. [22]

Varieties of *Madhu* (Honey) in *Ayurveda*: Eight types of Honey are described in *Ayurveda* with *Makshika* being the best one and *Bhramara* being the heaviest. [23]

Table 3: Varieties of *Madhu* according to different *Acharyas*[5,6, 24-27]

	Charak Samhita sutrasthan 27/243	***Sushruta Samhita sutrasthan 45/133***	***Ashtang Sangraha sutrasthan 6/98***	***Astang Hridya***	***Madanpal Nighantu Ikshukadi varga 9/23[5]***	***Kaidev Nighantu Aushadhi varga /179[6]***	***BhavPraksh Nighantu Madhu varga/6***
Varieties	4	8	4	-	4	8	8
Pauttika	+	+	+	-	+	+	+
Bhramara	+	+	+	-	+	+	+
Kshaudra	+	+	+	-	+	+	+
Makshika	+	+	+	-	+	+	+
Chhatra	-	+	-	-	-	+	+
Aarghya	-	+	-	-	-	+	+
Auddalaka	-	+	-	-	-	+	+
Dala	-	+	-	-	-	+	+

Properties and therapeutic uses of different types of honey

(1) *Pauttika* honey

- Honey collected by small black bee resembling a gnat called *Pauttika. Pauttika* bees build their home inside the hollows of trees.[28]
- *Pauttika* honey has ghee like colour.[28]
- This honey is especially *Ruksha* (dry), *Ushna* (hot) because of its association with poison (bees feeding on poisonous flowers also).[29]
- It aggravates *Vata, Rakta* and *Pitta* and this is also *Chhedi* (cuts tissues).[29]
- It produces heart–burn and intoxication.[29]

(2) *Bhramara* honey

- *Bhramara* bees are popular common bees (which are black in color and of medium size) honey collected by them is called *Bhramara* honey.[30]
- It is white in color.[30]
- This honey is *guru* (not easily digested) because of its *Picchhila* (slimy) and *Atiswadu* (excessively sweet) properties.[32]
- It is *Rakta pitta shamaka*.[30]

(3) *Kshaudra* honey

- Honey produced by small brown bee is called *Kshaudra* honey.[33]
- It is brownish in colour.[31]
- This honey is especially *Sheetha* (cold), *Laghu* (easy to digest) and *Lekhana* (scarificant).[32]
- It is especially beneficial in diseases like *Prameha* (diabetes).[33]

(4) *Makshika* honey

- *Makshika* bees are brown in colour and big in size, honey produced by them is called *Makshika* honey.[34]
- *Makshika* honey has oil-like colour.[31]
- It is *Laghu* (lighter than *Kshaudra*), *Ruksha* (dry), best in qualities and especially beneficial in diseases like asthma.[23]
- It is also useful in *Kamla* (jaundice), *Arsha* (piles), *Kshata* (phithis), and *Kasa* (cough).[35]

(5) *Chhatra* honey

- *Chhatra* bees are yellowish brown bees which makes umbrella shaped hives in forests. Honey produced by them is called *Chhatra* honey.[36]
- *Chhatra* honey is brown yellow in color.[36]
- It is *Madhura vipaka* (sweet after digestion), *guru* (heavy to digest), *Sheetha* (cold), and *Picchhila* (slimy).[36]
- It cures bleeding disorders, leucoderma, diabetes and worm-infestations.[36]

(6) *Aarghya* honey

- *Aarghya* bees make honey from *Madhuka* (*Madhuka indica*) trees, have sharp mouth, and are yellow in colour.[37]
- *Aarghya* honey is white in color.[37]
- It is *Kashaya* (astringent in taste), *Katu vipaka* (pungent after digestion) and eliminates vitiated *Kapha* and *Pitta dosha*.[37]
- It is *Balya* (strengthening) and beneficial for eyes.[37]

(7) *Auddalaka* honey

- *Auddalaka* are small brown insects which store honey inside ant hills.[38]
- The color of *Auddalaka* honey is yellowish brown.[38]
- *Auddalaka* honey is *Kashaya* (astringent) and *amla rasa* (sour), *Katu vipaka* (pungent after digestion) and aggravates *Pitta*.[38]
- It is useful in skin diseases and helps in modulation of voice.[38]

(8) *Dala* honey

- Unprepared honey, found in flowers.[39]
- The color of *Dala* honey is pink.[40]
- *Dala* honey is *Ruksha* (dry), sweet, sour and astringent in taste.[39]
- It mitigates vomiting and diabetes mellitus.[39]

Therapeutic uses of Honey (*Madhu*)

- It is used for cold, cough, fever, sore eye and throat, tongue and duodenal ulcers, liver disorders, constipation, diarrhea, kidney and other urinary disorders, pulmonary tuberculosis, marasmus, rickets, scurvy and insomnia.[9]
- It is applied as a remedy on open wounds after surgery.[9]
- It prevents infection and promotes healing.[9] It has been proved that honey promotes rapid healing as it stimulates tissue regeneration, angiogenesis, and fibroblast growth. Epithelial cell growth is stimulated as these cells grow with the skin level so that no scab is formed and so no excessive scarring and hypertrophication. Anti-inflammatory action of honey soothes and promotes healing by reducing pain and swelling.[41]
- Recent researches have shown that *Pratisarana* of *Laksha Churna* with *Madhu* on scaling wound can have better line of treatment in the successful management of tartar without any systemic use of drugs.[42]
- Honey works quicker than many antibiotics because it is easily absorbed into the blood stream.[9]
- It is also useful in healing of carbuncles, chaps, scalds, whitlows and skin inflammation; as vermicide; locally as an excipient, in the treatment of aphthae and other infection of the oral mucous membrane.[9]
- It is recommended in the treatment of pre-operative cancer.[9]
- Honey, mixed with onion juice, is a good remedy for arteriosclerosis.[9]

- It is used as a medium in the preservation of cornea.[9]
- Honey is an important ingredient of certain lotions, cosmetics, soaps, creams, balms, toilet waters and inhalants.[9]
- As a demulcent, honey and warm barley water are given internally in constipation and indigestion, in bronchial affections, asthma, chronic colds, troublesome coughs and sore-throat.[2]
- It is a useful laxative for children who take it readily; and it is safer and far better for them than cane-sugar.[2]
- When combined with milk, honey forms an ideal food for growing children and adults.[2]
- Honey is a pleasant vehicle for administering bitter mixtures for cough and fever especially in children.[2]
- In severe cases of malnutrition with heart weakness and in cases of pneumonia, honey has been found to have a marked effect in reviving the heart's action and keeping the patient alive.[2]
- In the west, honey is coming into more and more extensive use in curing rickets, marasmus, malnutrition, scurvy and other conditions in which various malts, like cod-liver oils and other patent foods were formerly prescribed.[2]
- In old age honey is especially useful in providing energy and heat to the body, which has little of it at that stage. In addition to it "it dries up the phlegm and clears the system of mucus which is the two necessary weaknesses that a man generally fall victim to in his old age."[2]
- The use of honey internally and of sunlight externally to the body direct, has been eulogized as an ideal remedy to regulate the secretion of the internal glands and calcium metabolism.[2]
- Practitioners of Hindu-Greek-Arabic schools of medicine give honey to diabetics with many of their medicinal preparations. The ferment and a special protein as the vitamins in honey, perhaps account for the beneficial action of honey in diabetes. Since honey consists of velulose, it is not harmful in diabetes.[2]
- Paste of honey with flour is a popular application to promote maturation of abscesses, ulcers and buboes.[2]
- As an emollient, it is used as a gargle to cure aphthae in the mouth and as a vehicle to other agents; it is used as an application to the throat in thrush and pseudo-membranous deposits.[2]
- As such it is also applied to sore nipples and to swollen mammae for drying up milk.[2]
- With lime it is used as an external application to the temples in headache, to the abdomen or round the navel in colic and to other painful parts, such as bruises and sprains.[2]
- Honey by itself or mixed with ghee, applied to burns, ulcers, scalds and wounds soothes and heals them rapidly.[2]
- Rubbed over the teeth with charcoal powder it makes them clean and white as snow.[2]
- Rubbed over greasy, dirty hands, it cleanses them rapidly.[2]
- It has hypnotic action in bringing sound sleep if taken with cold water before going to bed in doses of two teaspoonfuls in a big cupful of water. Babies generally fall asleep after taking honey.[2]
- It decreases flatulence and increases general metabolism and also the quantity of urine among children.[2]
- Recent researches have proved that *Rasanjana Madhu Ashchyotana* (RM eye drops) are very effective in the management of *Netra Abhishyanda* viz. Infective conjunctivitis.[43]

In *Ashtang Hridya*, the therapeutic uses of Honey are explained as follows:[47]

- Honey is very good for eyes and eye sight.
- It quenches thirst.
- Reduces effects of poison.
- Stops hiccups.
- It is very useful in urinary tract disorders, worm infestation, bronchial asthma, cough, and diarrhea and vomiting.
- It heals wounds & helps in quick healing of deep wounds.
- Initiates growth of healthy granulation tissue.

Precautions to be taken while using honey

- Do not eat honey in excess quantity due to its properties - heavy, rough, astringent and cold. If taken in excessive quantity, produced a condition called *Madhvama* (a situation called indigestion of honey in *Ayurveda*) no other kind of indigestion is more difficult to treat than that caused by honey because of the need of opposite kinds of treatment. Hence it is very severe and kills immediately like poison.[44]
- Honey should not be heated, or mixed with hot foods. Also should not be consumed when you are working in hot environment where you are exposed to more heat or during hot seasons. Honey includes nectar of various flowers of which some may be poisonous. Poison has hot or *Ushna* qualities. When honey is mixed with hot and spicy foods the poisonous properties get enhanced and cause imbalance of *Doshas*.[44,49]
- Do not drink hot water after eating honey.[45]

- Because of softness, coldness and being produced by the juice of many plants, honey is incompatible with hot things.[48]
- Honey and water, honey and ghee, mixed in equal quantities should not be consumed.[46] as it has been proved that heating of honey reduces the specific gravity with a subsequent rise in its ash value, pH, HMF (hydroxymethyl furfuraldehyde), browning, phenolics, and antioxidant activity. The mixing of honey with ghee brings about enhancement in browning, antioxidants and specific gravity without altering the food consumption and organ weight of the rats. The study revealed that heated honey (>140^{0}C) mixed with ghee produces HMF which may produce deleterious effects and act as a poison in due course.[50]
- Honey should never be mixed with rain water.[45]
- Honey should not be consumed with lotus seed.[45]
- Avoid giving honey to infants under 12 months to avoid the risk of Botulism (a type of food poisoning). Honey sometimes contains dormant endospores of the bacterium *Clostridium botulinum,* which can be dangerous to infants, as the endospores can transform into toxin-producing bacteria in the infant's immature intestinal tract, leading to illness and even death.[1]

DISCUSSION

Honey is a valuable product of nature since ancient times. Various ingredients of honey have helped it to become not only a sweet liquid, but also a natural product with high nutritional and medicinal value. There are many types of honey mentioned in *Ayurveda*. According to *Charak samhita, Ashtang sangraha and Madanpal nighantu madhu* is of 4 types while in *Sushruta samhita, Kaideva nighantu & Bhavprakash nighantu madhu* is of 8 types. Amongst them, *makshika* honey is the best one and the *Bhramara* honey is the heaviest one. It is the best *Yogvahi* substance. Fresh honey helps to increase body mass while old honey produces constipation and decrease body mass. Cold honey should always be preferred. Honey is a valuable product of nature, which has universally accepted medicinal, dietary and cosmetic properties. Honey can be used singly or in combination with other substances in the treatment of various diseases. Honey is an important ingredient of certain lotions, cosmetics, soaps, creams, balms, toilet waters and inhalants. It should be kept in mind that honey should not be heated or consumed warm as it causes toxic effect.

CONCLUSION

It can be concluded that honey is an invaluable natural substance with many diverse usages. It strengthens the immunity and helps to maintain the health by preventing various types of diseases but it must be pure and genuine.

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