

Honey As Functional Food and Nutraceutical: A Review[†]

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Abstract: Honey is a natural product made by bees from nectars of flowers. Its nutritional and health benefit are known from ancient times. It is a rich source of fructose and glucose and contain many other sugars including maltose, sucrose and other complex carbohydrates. It is used as natural preservative, flavoring and sweetening agents in many foods and beverages. Its sweet taste makes it more palatable to children and has a remarkable role in child nutrition. Honey has got various therapeutic benefits like antioxidant, antimicrobial, antifungal, gastroprotective and helps in metabolism, treatment of wounds, burns, ophthalmic conditions, diabetes and so on. Ayurveda describes honey as ‘madhu’. Eight varieties of honey based on the collection by different bees are mentioned in ayurvedic texts and each variety has its own properties. Makshika variety of honey is considered as best among them. Honey is used as medication internally as well as externally. Administration of honey from the birth itself along with ghee is mentioned in Ayurveda which acts as an immunomodulator. It can be also used as an adjuvant in medicines. It is also helpful in respiratory tract disorders such as common cold, sore throat, cough. It has scraping property that helps in metabolism of fat. Ayurveda considered honey as yogavahi, that is without changing its properties, it will enhance the medicinal qualities and also helps them to circulate in the body. Functional food and nutraceuticals gain importance in the present era as they provide many health benefits characterized by disease prevention and alleviation. Honey intake as medicine and food has many nutritional and therapeutic benefits which makes it a functional food and nutraceutical.

Keywords: Honey; ayurveda; honey and functional food; honey and nutraceutical; madhu

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1. Introduction

Healthy diet is the key role for the balanced nutrition. In the present era, nutrition has got a varied perspective like dietary supplements, functional food or nutraceuticals. These are natural compounds which provides health benefits as well as pharmaceutical benefits [1]. Honey is a natural product made by bees from nectars of flowers. It has got varied properties and is used from ancient times. Honey is an excellent nutrient as well as sweetening and flavoring agent. Now-a -days, with honey and bee products many ailments are getting treated which is known as Apitherapy and it is considered as complementary and integrative medicine in many countries.[2]

Ayurveda, the science of life has mentioned honey as “madhu” and described its varied properties based on the collection of honey from different bees. Charaka Samhita and Ashtanga Sangraha mentioned 4 types of madhu whereas Susrutha Samhita mentioned eight types of madhu. Each madhu has its own properties and therapeutic benefits.

2. Material and methods

Sources of data collection:	43
The Ayurvedic references for this work were collected from classical texts of Ayurveda and the articles were searched in the databases from Pubmed, Scopus and Google scholar.	44 45 46
<i>2.1 Result and Discussion</i>	47
Food serves the purpose of providing nutrition as well as satisfaction to mind. As the science is advancing new trends in nutrition also emerges. Nutraceuticals and functional food can be considered as dietary supplements, which can be included in the daily diet that provides health benefits. These foods can be natural food or processed foods.	48 49 50 51
Ayurveda considered Ahaara as Mahabhaishajya, i.e food is the superior medicine. A balanced diet which provides adequate nutrition provides a healthy physique. Honey which is a natural product has its application in daily life from ancient time itself. It has got many properties which is beneficial for mankind in daily life as well as treatment for many ailments.	52 53 54 55 56
<i>2.1.1 Composition of Honey</i>	57
Honey is a rich source of carbohydrates, i. e its major components are glucose and sucrose. In addition to these oligosaccharides, vitamins, minerals, proteins, amino acids and enzymes are also present.[3]	58 59 60
<i>2.1.2 Types of Honey</i>	61
Three basic types of honey are:	62
<ul style="list-style-type: none"> • Single origin: honey from one specific plant • Multi – flower: honey collected by bees from different plants and flowers • Localnectar collected from specific region. 	63 64 65
Based on the production:	66
<ul style="list-style-type: none"> • Extracted honey – honey produced by centrifuging the honey comb • Pressed honey – honey produced by pressing the honey comb • Drained honey- honey produced by draining the honey comb.[4] 	67 68 69
<i>2.1.3 Functional and Nutraceutical Properties of Honey</i>	70
<ul style="list-style-type: none"> • ANTIOXIDANT PROPERTIES OF HONEY 	71
Honey is a rich source of antioxidants which helps in the preservation of food and also in the protection of human health. Studies have proved that phenolic compounds present in the honey is responsible for its antioxidant activity. Antioxidant property also depends on the colour of the honey. Darker the honey more the antioxidant activity.[5]	72 73 74 75
<ul style="list-style-type: none"> • ANTIMICROBIAL PROPERTIES OF HONEY 	76

Honey inhibits the growth of microorganisms with their enzymatic glucose oxidation reaction, which is considered as the main factor for antimicrobial activity. Other factors responsible for antimicrobial activity are low pH, low protein content, low redox potential due to high level of reducing sugars, high osmotic pressure and high carbon to nitrogen ratio. Some of the antimicrobial properties of honey originated from the bees itself, due to their enzymatic action and sometimes from the plants from which they collect honey and some antimicrobial actions are based on honey storage (Maillard products).[3]	77 78 79 80 81 82 83 84
Depending on heating, light and storage of honey antimicrobial action also varies. Unheated and fresh honey exhibits maximum antimicrobial action. Studies also proved that heating and storage of honey also has antibacterial activity [3]. Studies revealed that manuka honey has significant antimicrobial activity against E. coli and Staphylococcus aureus as they have the highest level of nonperoxide activity.[5]	85 86 87 88 89
• MEDICINAL PROPERTIES OF HONEY	90
It is also useful in mild to moderate superficial and partial thickness of burns.[6]	91
Honey acts as hepatoprotective agent against paracetamol induced liver damage.[7]	92
Studies revealed that honey intake for short term or long term may increase the brain protein and catalase the activities of brain cells, which will increase the antioxidant capacity and helps in defense against cell damage, cell injury and degenerative process of mitochondria, microsomes and DNA.[8]	93 94 95 96
Invitro studies proved that manuka honey is a gastroprotective agent against H. pylori as it has bactericidal effect.[9]	97 98
Honey along with anti-diabetic drugs improve glycemc control, enhance antioxidant defenses and reduce oxidative damage.[10]	99 100
Usage of honey to treat cough was known from olden days. In vivo studies revealed that use of honey effectively reduce the asthma related histopathologic changes of airway and prevent the occurrence of asthma. For eliminating mucus- secreting goblet cells hyperplasia.[11]	101 102 103 104
<i>2.1.4 Honey in Ayurveda</i>	105
Ayurveda mentioned honey as madhu. It has got various synonyms such as makshikam, kshoudram, saradam, pushparasodbhavam and	106 107
bhringavantham. Acharya Susrutha has mentioned about 8 types of honey based on the collection of bees.	108 109
PROPERTIES OF HONEY IN AYURVEDA	110
• Acharya Susrutha mentioned that honey has Madhura rasa (sweet in taste) and Kashaya as anurasa (astringent as subtaste). It is seetha virya (cold in potency) and tridoshahara (alleviates vata, pitta and kapha). Ayurveda considered honey as yogavahi, that is without changing its properties, it will enhance the medicinal qualities and also helps them to circulate in the body.[12]	111 112 113 114 115
• Based on the collection and storage of honey, ayurveda describes about navina madhu (fresh honey) and purana madhu (old honey - stored for atleast one year). Fresh	116 117

honey has property of nourishing the body whereas the old honey has scraping property which reduces fat and obesity.[13]

- TYPES OF HONEY IN AYURVEDA [14,15]

Table 1 – types of honey

TYPE	TYPES OF BEES COLLECTING HONEY	COLOUR	PROPERTIES
Pauttika	Small black bee	Ghee like colour	Ruksha, ushna, aggrevates vata and pitta Chedi, vidahi and madakrit
Bhramara	Medium sized black bee	White	Guru, picchila and atimadhura
Kshaudra	Small brown bee	Brownish	Seetha, laghu and lekhana
Makshika	Big brown bee	Oil -like colour	Laghu,ruksha Especially in swasa roga (asthma)
Chhatra	Yellowish brown bee	Brown yellow	Madhura Vipaka, guru, seetha, picchila Increases raktha and pitta It subsides swithra (leukoderma), meha(diabetes mellitus) and krimi(worm infestation)
Aardhya	Yellow colour bee with sharp mouth	White	Atichakshushya, alleviates kapha and pitta, Kashaya rasa, katu Vipaka, balya and mitigates vata
Audhalaka	Small brown insects which hide in anthills	Yellowish brown	Ruchikara, allivates kusta and visha
Dala	Unprepared honey, found in flowers	Pink	Kashaya, amla, ushna, increases pitta, katu Vipaka It mitigates chardhi (vomiting) and prameha (diabetes mellitus)

- MEDICINAL PROPERTIES OF HONEY IN AYURVEDA

Acharya Susrutha mentioned shasti upakramas (sixty treatment modalities), for vrana ropana (wound healing). Application of honey is one among them. [16]

For healing of kshathoshma (acute inflammation) application of honey with ghee is mentioned in the context of aganthu vrana (traumatic wounds). [17]

Studies revealed that pratisarana (rubbing) with laksha churna with honey is a choice of treatment for management of tartar without using any systemic drugs.[18]

Administration of honey from the birth itself along with ghee is mentioned in Ayurveda which acts as an immunomodulator. [19]

It is used as adjuvant for many medicines. For example, sithopaladi choorna is taken along with honey and ghrita for cough.

For prameha (diabetes mellitus) powder of haridra mixed with honey and juice of amalaki fruits.[20]

Honey is used in various procedures for treatment of eyes. Recent study has proved that rasanjana madhu aschotana (eye drops) is very effective in Netra abhisyananda (infective conjunctivitis).[21]

Honey is the first ingredient in niruha basti (decoction enema).[22]

4. Conclusions

Functional food and nutraceuticals are new approach in the area of nutrition. People are more aware about their health nowadays and searching for new options for betterment of health status. Honey a natural product, known and used from olden days. It has got many health benefits. Honey intake as medicine and food has many nutritional and therapeutic benefits which makes it a functional food and nutraceutical.

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