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Effects of honey and bee venom on human health

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ABSTRACT

Throughout history, humans have always been exposed to numerous pathogenic and non-pathogenic threatening factors and have used various methods and agents to treat and control them, one of these methods is the use of honey and bee stings. Honey is a natural sweetener produced by bees from the nectar of flowers with the secretions of living parts of plants. Nowadays, honey and bee stings are used to remedy a wide range of diseases include allergies, blood, digestive, heart, lung, skin, etc. Databases were searched to obtain articles including "Google Scholar", "ISI", "Scopus", "PubMed", and "Science Direct". Keywords used in this study included honey, bees and human health in their titles. The recent findings have shown that there is a complex combination of fifty different substances in bee venom, including protein, phosphorus, calcium, magnesium, copper, folic acid, glucose, fructose, histamine and amino acids. Allergic reactions are involved. In general, bees and their stings can play a role in the treatment of disorders.

Keywords: Honey, Bee venom, Heart, Human health.
Article type: Review Article.

INTRODUCTION

Honey and its by-products are used for food, health and medicine. The healing properties of honey largely depend on the flower source from which the bees collect nectar and pollen (El-Seedi *et al*. 2020). Honey is a sweet and delicious liquid *(*Habib *et al. 2014;* Manouchehri *et al*. 2021). Honey is remarkable for its therapeutic abilities and nutritional properties over time (Majtan *et al*. 2014; Meo *et al*. 2017). Honey has different properties depending on the location, geographical distribution, and extraction methods (Nikhat & Fazil 2022). It also exhibits antioxidant and anti-inflammatory effects (Bogdanov *et al*. 2008) and consumes by all age groups without any religious or cultural barriers (Ajibola *et al*. 2012). In addition, it displays health-promoting properties such as

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antimicrobial, anticancer, and antidiabetic activity and also has a protective effect on the cardiovascular, nervous, respiratory, and gastrointestinal systems (Cianciosi *et al*. 2018). Moreover, honey compounds make it a useful substance for wound and burn to heal (Majtan *et al*. 2014). Honey production worldwide is higher than one million tons annually (Bogdanov *et al*. 2008). The world's top producers of honey are China, Turkey, Argentina, Ukraine, Mexico, and the United States (Bogdanov *et al*. 2008). Honey is consumed as a food source, even as a dietary supplement (Mendes *et al*. 1998; Silva *et al*. 2009). Major components of honey include monosaccharides such as fructose and glucose (65%), and also about 25 different oligosaccharides (Bogdanov *et al*. 2008) as well as approximately 18% water (González-Miret *et al*. 2005). Hydrocarbon, protein and enzyme compounds in honey present in tiny amounts (Bogdanov *et al*. 2008). Bee venom is a natural toxin that is produced by the glands in the abdominal cavity of honeybee workers and then stored. These toxins play an important role in bee defence strategies (El-Seedi *et al*. 2022). There are medicinal compounds in bee venom and also bradykinin-potentiating factor for neurodegenerative illnesses like Parkinson's (Lashein *et al*. 2018). Bradykinin-potentiating peptides function in promoting vasodilation, reducing blood pressures, and increasing vascular permeability (Camargo *et al*. 2012) and also is used in the manufacture of antihypertensive drugs (Lewis & Garcia, 2003). The agents of bee venom includes enzymes, peptides, and biogenic amines, including melittin, phospholipase A2, and apamin (Jilo, 2016). Methylene is the most important therapeutic component of bee venom (Elieh Ali Komi *et al*. 2018). On the other hand, phospholipase is an allergen found in bee venom, which causes anaphylaxis by lowering blood pressure and causing inflammation (Pucca *et al.* 2019), even though, it was also recently discovered to have immunomodulatory effects (Magrioti & Kokotos. 2019). The ability of bee venom to cure inflammation and cancer has been discovered a long time ago (El-Seedi *et al*. 2020).

MATERIALS AND METHODS

Databases searched to obtain articles included “Google Scholar”, “ISI”, “Scopus”, “PubMed”, and“ Science Direct”. Keywords used in this search included honey, bees and human health in their titles.

RESULTS AND DISCUSSION

Honey and diabetic wound treatment

The existence of microorganisms resistant to antibiotics has drawn attention to use honey in the treatment of wounds. Numerous studies have established the antimicrobial properties of honey (Molan, 2006). However, in other experiments, diluted honey was applied to the wounds and immediately led to sterilization of the wounds (Molan 2001). According to studies, honey has a significant effect on wound cleaning and shortens the time required for debridement and full healing of diabetic foot wounds. It also lessens the discomfort brought on by dressing changes (Astvar *et al*. 2018).

Anti-cough and expectorant properties of honey

The honey's expectorant and anti-cough qualities are produced by thinning the secretions in the airways and enhancing the performance of tissue lining cells, while sleeping, consumption of 2.5 to 10 mg honey sedates cough (Firoozfar *et al.* 2016). In a different trial, Cohen *et al.* (2012) examined the antitussive effects of three different varieties of honey in comparison with a placebo in 300 kids aged one to five years who had colds and nocturnal coughs. There was no discernible difference between the three varieties of honey, however, they were all more effective than a placebo at lessening the severity and frequency of coughing and enhancing sleep in both children and parents (Cohen *et al*. 2012).

Honey and heart diseases

The high glucose content of honey has a positive impact and strengthens the cardiac muscles. In addition, it controls blood pressure, widens blood vessels and it guards against heart attacks. Honey also aids in the digestion of lipids around the heart (Ribière *et al*. 2000). Honey contains antioxidants like vitamin C, monophenols, flavonoids, and polyphenols. Regular consumption of flavonoids is linked to a lower risk of cardiovascular illnesses. Numerous phenolic chemicals found in honey which promise in the treatment of cardiovascular disorders. The antithrombotic, anti-ischemic, anti-oxidant, and vasorelaxant properties of phenolic compounds are the key preventive effects in coronary heart disease (CHD). Flavonoids may reduce the incidence of CHD in three ways: by increasing coronary vasodilatation, lowering blood platelet clotting potential, and preventing LDL from oxidizing (Khalil & Sulaiman 2010).

Honey and diabetes

The consumption of honey in diabetes (type I and type II) is linked to a much reduced glycemic index. Honey raises plasma glucose levels in diabetic individuals much less than dextrose does. In addition, it decreases the levels of homocysteine, CRP, and blood lipids in both normal and hyperlipidemic patients (Bansal *et al*. 2005).

Therapeutic properties of bee venom

Bee venom cures diseases by reducing the sensitivity of leukocytes to allergens and increasing the number of T cells and support cells. Also, bee sting activates PLA2 enzyme and is effective in the production of melittin. It causes an increase in the synthesis of cytokine activation, which ultimately increases the secretion of arachidonic acid in the immune system. Melittin, a significant peptide found in bee venom is a promising possibility for cancer treatment (Rady *et al.* 2017). Antioxidants are among the most physiologically active compounds in honey and are crucial for defending living things against oxidative damage and preventing the development of chronic illnesses like cancer, cardiovascular disease, and diabetes. Honey contains enzymatic and non-enzymatic antioxidants such as glucose oxidase, catalase, L-ascorbic acid, flavonoids, phenolic acids, carotenoids, organic acids and amino acids (Dong *et al*. 2013). Another significant class of powerful substances that contribute to the appearance and functionality of honey is polyphenols (Isla *et al*. 2011). Honey has a long history of being one of the best medicines for treating wounds. It is useful in the remedy of burns, diabetic wounds, and open wounds, according to scientific investigations. The local application of honey using bandages and adhesives proved efficient in mending wounds and lowering discomfort brought on by adverse effects, according to experimental examinations on four individuals (Cooper 2016). Modern biochemical analyses are used to identify the components in insect venom. Using natural poisons in the treatment of specific diseases has a long history in human culture and civilization, and bee venom has a special position among them. As a result, roughly 18 pharmacologically active compounds have been discovered, including histamine and epinephrine as well as the peptides melittin, apamin, adolapine and MCD peptides. In addition, non-peptide components found in the insect venom include lipids, carbohydrates, and free amino acids. These poisonous chemicals have a wide range of therapeutic qualities (Ali 2012). Traditional medicine uses bee venom to treat severe and persistent inflammatory disorders like rheumatoid arthritis to lessen pain and swelling (RA). According to a study, injecting honey bee venom into specific acupuncture spots helps mice with arthritis experience less oedema (Robertson 2010). Due to the side effects of anti-inflammatory drugs, there is a great desire to use traditional medicine there have been various reports about other therapeutic effects of bee venom. Robertson (2010) reported the remarkable effect of bee venom in inhibiting the proliferation of various types of cancer cells, such as kidney, liver, lung, and leukaemia due to cancer. In addition, Some authors demonstrated that bee venom therapy delivered through acupuncture results in a 80% decrease in the activity of cytoplasmic, liposomal, and matrix proteases as well as a significant decrease in the level of reactive oxygen species in rats with rheumatoid arthritis induced by type 2 collagen (Robertson 2010; Ali 2012).

CONCLUSION

The advantages of bee therapy can be attributed to its extremely low cost in comparison with the high cost of chemical medications, as stated in the explanations provided. Bee venom is an incredibly powerful medicine for the treatment of various ailments when administered in a controlled amount while considering all factors of the treatment.

Conflict of interest

No potential conflicts of interest were reported by the authors.

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