

Honey - The Food of Heaven; Healing in this world and the Hereafter

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INTRODUCTION

Nutrition has an integral role in preserving health, and the importance of diet has consistently assumed a notable standing in traditional Islamic medicine.

As gathered in the Hadith, the Prophet Muhammad once stated that *"Allah did not create a disease for which he did not also create a cure."* Muslims are therefore motivated to study the Medicine of the Prophet as an alternative to current treatments, or as an addendum to modern medical therapies.

Honey is represented as a basis of healing in the Quran:

There comes forth from their [bees'] bellies, a drink of varying colour wherein is healing for men. (Quran 16:69).

It is also mentioned as one of the foods of Jannah (heaven). [1]

The description of Paradise which the pious have been promised is that in it are rivers of clarified honey, clear and pure... (Quran 47:15).

Honey, an inherently sweet and sticky substance, is primarily produced by honeybees (*Apis mellifera*) from flower nectar. Honey wields a superfluity of pharmacological activities, namely: antioxidant, antimicrobial and anti-inflammatory action, because of the presence of a vast assortment of bioactive compounds. Such use of honey for biomedical applications has earned remarkable focus over the years, with the evolution of novel applications taking benefit of its outstanding chemical characteristics. [2]

As a result, besides honey's widespread utilisation as a typical food and flavouring agent, honey is an attractive natural antimicrobial agent.

ANTIBACTERIAL

The antibacterial activity is one of the most reported biological properties, with many studies demonstrating that honey is active against clinically important pathogens.

The status of antimicrobial activity ranges from honey to honey and is firmly linked to its floral basis, geographical source and processing methods. It is specified in the publications that an interplay of distinct parameters, i.e. low water content, high sugar content, acidity, and hydrogen peroxide compounds, influence the empirical antimicrobial action of honey.

A 2019 study by the Institute of Molecular Biology, Slovak Academy of Sciences assessed the antibacterial activity of 57 Slovak blossom honey against *Staphylococcus aureus* and *Pseudomonas aeruginosa* and examined the role of several bioactive substances in the antibacterial action of honey.

Inhibitory and bactericidal activities were analysed to demarcate the minimum inhibitory and bactericidal engagements. The ranges of hydrogen peroxide (H₂O₂), and total polyphenols (TP) were specified. Samples displayed different antibacterial efficacy against the tested bacteria as follows: wildflower honey > acacia honey > rapeseed honey.

Across the board, the antibacterial activity of the honey was statistically significantly correlated with the contents of H₂O₂ and TP in them. The antibacterial activity of the

12 selected honeys was markedly decreased by treatment with catalase, while it remained fairly constant after the inactivation of the glucose oxidase enzyme with proteinase-K digestion. [2] Acquired results suggest that the antibacterial activity of blossom honey is largely moderated by H₂O₂ levels present which is impacted principally by polyphenolic substances.

WOUND HEALING

Stingless bee honey has a unique flavour and tart taste compared to *Apis mellifera* honey. Presently, the appeal of farming stingless bees is increasing among rural citizens to satisfy the elevated need for natural honey-based products.

Several investigations on stingless bee honey have shown diverse medicinal properties for wound healing applications. These include antioxidant, antibacterial, anti-inflammatory, and moisturising attributes related to wound healing. The effect of such applications, such as incorporation into hydrogels, has enticed researchers worldwide.

As a result, the significance of stingless bee honey against wound infections can be enhanced in the future to optimise recovery rates.

Some of the benefits of the use of honey for wound-healing solutions are the acceleration of dermal restoration and epithelialization, angiogenesis advancement, immune response rise and the decline in healing-related infections with pathogenic microorganisms.

This is due to stingless bee honey's therapeutic properties, including antioxidant, antibacterial, anti-inflammatory, and moisturising capabilities. Consequently, it can be deduced that stingless bee honey-based hydrogel has an increased possibility to be a useful wound dressing. Clinical investigations of stingless bee honey should be persisted to deliver exceptional wound dressing and improve current wound dressings. [3]

As revisited, honey offers a favourable prospect for use in wound-healing strategies, either by immediate application, contained in fibrous membranes, or in hydrogels, with extremely promising outcomes in *in vitro* and *in vivo* trials.

However, additional research is required to overcome the main challenges of employing honey for biomedical applications.

ANTI-CANCER

It is well known that dark honeys are distinguished by their increased content of polyphenols and flavonoids, which may be the reason of their antioxidant and anticancer capabilities.

Prior analysis has revealed that bee honey has varying *in vitro* effects on cancer cell lines relying on the plant source.

For example, some types of honey have anti-proliferative effects against human cancer cell lines, such as thyme honey, while others (e.g. fir honey) have been shown to stimulate the viability of human cancer cell lines, such as MCF7. [4]

In one study, acacia honey from both high and low altitudes were led to exhibit cytotoxic consequences against three human cancer cell lines.

High altitude honey indicated raised cytotoxicity against HCT116 and MCF7 cells, and also possessed heightened levels of flavonoids, versus the low altitude honey.

However, these conclusions are limited due to the small number of honey samples acquired from solely two areas. Thus, it is not yet feasible to generalise such outcomes, and further research is required to validate the results.

ANTI-INFLAMMATORY

Inflammation is a key role in developing chronic diseases including cancer, cardiovascular diseases, diabetes & arthritis which possess a huge challenge for treatment. With convincing proof of the role played by nutritive modulation in averting inflammation-related conditions, there is a growing curiosity in the quest for innately functional foods with restorative and prophylactic actions.

Honey maintains specific phenolic and flavonoid compounds, of which there is a potent interest in their biological and clinical actions against inflammation-mediated chronic diseases.

Targeted tissues benefit from the honey's pharmacological and preventive actions which modulate the inflammatory cytokines processes and eventually facilitate the rigour of chronic inflammatory diseases. [5]

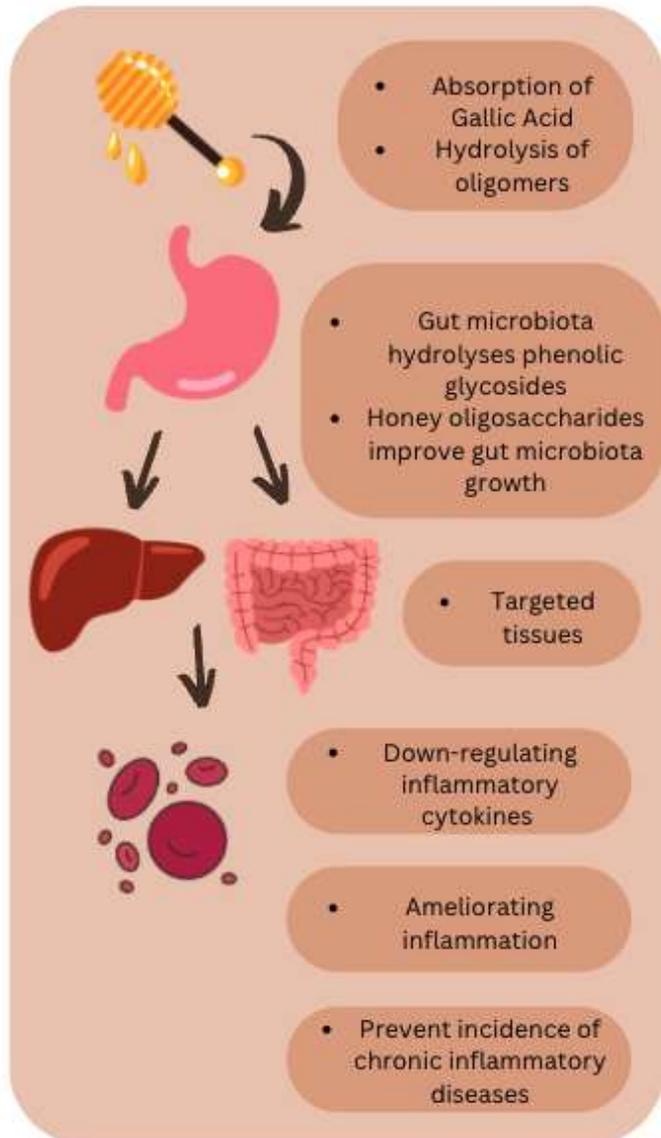


Diagram displaying the effects of honey downregulating inflammation. [5]

Nevertheless, the molecular mechanisms of polyphenols in honey are not totally defined. Additional studies are required in the nutrigenomics analysis to thoroughly explain the genome-wide effects of honey and practices of global gene expression, protein expression, intracellular signalling pathways, and metabolite production in reaction to certain compounds. Ultimately, dissect the outcomes of honey on gene expression profiling with particular focus on human intervention trials, ideally with large-scale randomised placebo-controlled studies, to deliver understanding into their preventative and restorative uses, as well as formulate efficacious procedures for relieving chronic inflammatory diseases.

CHALLENGES

The usage of neat honey for healing intent poses some issues, for example, its stickiness may hinder its appeal to clients and healthcare professionals, and the supervision of an acceptable medicinal concentration over a satisfactory timeframe may be contesting due to honey liquidity and leakage. [6]

This motivates researchers to interweave honey into multifarious formulations. Due to its low pH, honey bears enzymatic and biochemical stability, which can be lost if not appropriately processed for secure usage. Thus, the arrangement of suitable honey processing techniques is of foremost significance for its engaged use.

CONCLUSION

Honey is remarkable when likened to additional natural products with respect to its biochemical effects and health advantages. Such research has inspired scientists to incorporate honey into various formulations, for example, hydrogels, dressings, ointments, pastes and lozenges. [7]

This article expressed the central compounds of honey that sway said healing abilities, also demonstrating promising outcomes in in vitro and in vivo trials. With compelling evidence of the role recreated by nutritional modulation in inhibiting disease, there is accelerated appeal in the search of naturally functional foods with both preventative and therapeutic actions.

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