Original Article

Biological Activities of Natural Honey Produced In Basrah Governorate

Talib Albosolemy[1], Asaad Faraj Hamzah[2], Ahmed Abd Burghal[3*], Wijdan Hussein Al Tamimi[4]

[1]Biology Department, College of Science University of Basrah, Basrah, Iraq. E-mail: talib.ramadhan@uobasrah.edu.iq

[2]Technical institute of Basrah, Southern Technical University, Basrah, Iraq. E-mail: asaad.faraj@stu.edu.iq

[3*]Biology Department, College of Science University of Basrah, Basrah, Iraq. E-mail: ahmed.burghal@uobasrah.edu.iq

[4]Biology Department, College of Science University of Basrah, Basrah, Iraq. E-mail: wijdan.abdulsahib@uobasrah.edu.iq

Abstract

Honey is a unique food product that contains biologically active compounds derived from Bees and plants. These bioactive compounds can be linked to antimicrobial activity has the ability to destroy or inhibit the growth of certain pathogenic microorganisms. Three kinds of local honey were collected in Basrah governorate: *Ziziphus* (Sidr) honey (S), *Medicago* (Barsim) honey (B), and *Eucalyptus* (Calbtose honey) (C). Collected from honey shops in the province. The antibacterial potential of each honey was evaluated using 12 pathogenic strains, Gram positive bacteria (*Staphylococcus aureus, Streptococcus pyogenes, Streptococcus pneumonia, Staphylococcus* spp.), Gram negative (*Escherichia coli, Proteus vulgaris, Pseudonetum aeruginosa, Acinetobacter, and Pseudomonasus spp*.), and fungi (*Aspergillus niger*, *Candida albicans* and *Candida glabrata*). The results of the antibacterial activity against bacteria and fungi showed all honey types were significantly effective against pathogenic isolates. The highest values of the inhibition zone were about 50 mm by *Ziziphus* (Sidr) honey (S). The *Eucalyptus* (Calbtose honey) (C) showed lower values compared to the other types. The biological activity against fungi (Antifungal) showed the different types of honey had less effect than the bacteria. The results of antioxidants showed that all types of honey showed different actions, the highest by Ziziphus (Sidr) honey (S) (60%), followed by Medicago (Barsim) honey (B) (55%) and the lowest was (53%) by Calbtose honey (C). The bioactivity of honey on the biofilm was showed the highest values of Biofilm inhibition level was formed by ***Staphylococcus aureus*** at concentrations of 25 % of Barsim (B) compared to the other types, on the other side the maximum inhibition of biofilm was formed by *Pseudomonas aeruginosa* at concentrations 25 % was for Barsim (B).

Keywords: Honey, Antioxidants, Biofilm, Biological Activity.

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INTRODUCTION

Since antique times, almost 5500 years ago, honey has been consumed by humans (Adebolu, 2005). Most ancient people, including the Greeks, Chinese, Egyptians, Romans, Mayans, and Babylonians, ate honey both for dietary purposes and for its medicinal properties (Andrzej et al., 2018).

(Samarghandian et al., 2017) shown that honey can have a medicinal effect due to its anti-bacterial, anti-inflammatory, apoptotic, and antioxidant properties, this research could give practitioners substantial evidence to support the use of honey in the medical field. Compounds that have antioxidant and antibacterial properties are found in honey, particularly with gram-positive microorganisms, *staphylococcus*, and *Bacillus*, it may have a relevant role in the study products to mitigate the symptoms of infections with bacteria and contribute to healthier meals (Bueno-Costa et al., 2016). (Velásquez et al., 2020) reported that *Staphylococcus aureus*, *S. pyogenes*, *Pseudomonas aeruginosa*, and *Escherichia coli* were inhibited by all phenolic compounds extracted from honey samples.

Carbohydrates, mainly fructose and glucose, are components of honey, with remaining sugars including maltose, sucrose, and other complex carbohydrates. Honey also includes small yet important quantities of biologically active phenolic compounds, minerals, vitamins, amino acids, proteins, enzymes, organic acids, and other phytochemicals, in addition to carbohydrates (Bueno-Costa et al., 2016); (Kasprzyk et al., 2018). The chemical composition depends on the botanical and geographical origin of the source of honey, as well as the environmental conditions (Bogdanov et al., 2008).

Biofilms are sessile bacterial populations trapped in an extracellular polymeric matrix. Compared to cells living in a planktonic setting, bacterial cells trapped in biofilms are fundamentally recalcitrant to antimicrobials and are extremely hard to remove once established (Mathur et al., 2018). Biofilms have been documented to lead to physical, chemical, and antimicrobial defense (Donlan, 2002). The persistence of biofilms on medical instruments and surgical facilities in clinical environments enables some pathogens to infect patients easily (Kostakioti et al., 2013). Moreover, 70% of pathogenic bacteria have been shown to be immune to antibiotics currently in use (Katz et al., 2006). In order to tackle drug-resistant pathogens, synthesis and development