JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Bacterial Growth Inhibition Through Unifloral Honeys

Dr. Nisha V. Warade

Department of Zoology, Shankarlal Khandelwal Arts, Science and Commerce College, Akola, India.

E mail : *drnisha73@gmail.com*

ABSTRACT :

The current problem with synthetic & conventional antibacterial agents, led to the choice of natural products like honey as well as others by the populace, in the treatment of bacterial infections. Honey has been found to possess antibacterial property and is therefore employed for wound therapy. The present study evaluates the antibacterial spectrum and efficacy of honey against *Staphylococcus aureus* bacteria and was compared same with standard antibacterial drug, Vancomycin. The antibacterial activity is checked by Agar well diffusion method using different types of unifloral honey i.e. Jamun (*Syzygium cumini*), Lemon (*Citrus limon*), Ajwain (*Trachyspermum ammi*). From observation Jamun honey showed most inhibitory effect (zone of inhibition is 36mm in diameter) suggesting its high antibacterial activity and Ajwain honey showed lowest inhibitory effect.

Key words: honey, antibacterial activity, apiculture, Staphylococcus aureus.

INTRODUCTION:

Antimicrobial agents are essentially important in reducing the global burden of infectious diseases. However, as resistant pathogens develop and spread, the effectiveness of the antibiotics is diminished. This type of bacterial resistance to the antibacterial agents poses a very serious threat to public health, and for all kinds of antibiotics, including the major last-resort drugs, the frequencies of resistance are increasing worldwide [1,2]. The use of traditional medicine to treat infection has been practiced since the origin of mankind, and honey produced by *Apis mellifera* (*A. mellifera*) is one of the oldest traditional medicines considered to be important in the treatment of several human ailments. Currently, many researchers have reported the antibacterial activity of honey and found that natural unheated honey has some broad-spectrum antibacterial activity when tested against pathogenic bacteria, oral bacteria as well as food spoilage bacteria [3, 4]. In most ancient cultures honey has been used for both nutritional and medical purposes. The belief that honey is a nutrient, a drug and an ointment has been carried into our days, and thus, an alternative medicine branch, called apitherapy, has been developed in recent years, offering treatments based on honey and other bee products against many diseases including bacterial infections [5].

Nowadays, with the presence of multi-drug resistant microbes, alternative anti-microbial strategies are urgently needed. This need has led to a re-evaluation of the therapeutic use of ancient remedies, such as plants and plant-based products, including honey based upon the extensive searches in several biomedical science journals and web-based reports, we discussed the updated facts and phenomena related to the medicinal property of honeys with emphasis on their antibacterial activities in this review [6].

The honey has been used from ancient times as a method of accelerating wound healing [7] and the potential of honey to assist with wound healing has been demonstrated repeatedly [8,9].

Anti-infective drugs (antimicrobial agents) are critically important in reducing the global burden of infectious diseases [10, 11]. The occurrence of drug-resistant microorganisms diminished the development of antibiotics, and few pharmaceutical companies remain active in this area, posing a big challenge in this world [12].

MATERIALS AND METHOD:

Different types of unifloral honey [*Syzygium cumini* (Jamun), *Trachyspermum ammi* (Ajwain) & *Citrus limon* (Lemon)] were collected from KVK, Buldhana. The preloaded antibiotic discs (Vancomycin 30 µg) were obtained from HiMedia Jyoti Chemporium, Akola. The pure bacterial culture (*Staphylococcus aureus*) was obtained from Post Graduate Department of Microbiology, Shri Shivaji College, Akola. The media and glass wears (Petri dishes, test tubes, cotton Swabs, distilled water) needed for further use were sterilized by autoclave at 15psi at 121 °C for 20 minutes.

The honey obtained from the flowers of *Syzygium cumini*, *Trachyspermum ammi*, *Citrus limon* were subjected to antibacterial activity by using the agar well diffusion method. 100ml nutrient agar aqueous solution was made by dissolving 2.8 g of nutrient agar in distilled water and makes 100 ml solution and the pH was adjusted to 7.0. The inoculation was carried out in a laminar air-flow. Nearly 25ml quantities of nutrient agar were plated into the petri dishes and allowed them to cool and solidify for 40 minutes. After solidification of the media the bacterial culture (*Staphylococcus aureus*) were inoculated by swabbing method. Wells of 6 mm in diameter and 4 mm depth were made in the culture media by using sterilized cork borer to make four uniform wells in each plate. A drop of molten nutrient agar was used to seal the bases of each well. These wells were filled with 50µl of honey by using micropipette and were allowed to diffuse for 40 minutes. Preloaded discs of the antibiotic Vancomycin 30 µg was used as control. The antibacterial activities were determined after 24 hours of incubation at 37°C in incubator. The Antibacterial activities were measured from the diameter of the inhibition zone formed by the honey around the well. The zone diameter of inhibition produced by the honey after measuring was compared with the inhibition zone produced by standard antibiotic (Vancomycin). Each Sample was used in triplicate for the determination of antibacterial activity.

RESULT:

Effect of honey on the growth of bacteria is checked by agar well diffusion method using different types of unifloral honeys. From the different zone of inhibition calculated, Jamun honey showed highest antibacterial activity for the *Staphylococcus aureus* bacteria.

The inhibition zone diameter of honey samples from the flowers of Jamun (*Syzygium cumini*), Lemon (*Citrus limon*) and Ajwain (*Trachyspermum ammi*) plants have been determined and found to be of 36mm, 35mm, 32mm against *Staphylococcus aureus*. While the zone diameter of inhibition of standard antibiotic Vancomycin was 23 mm. Data collected is given in the form of mean of three values.

Plate 1: Nutrient agar plate showing Zone of Inhibition for *Staphylococcus aureus* bacteria

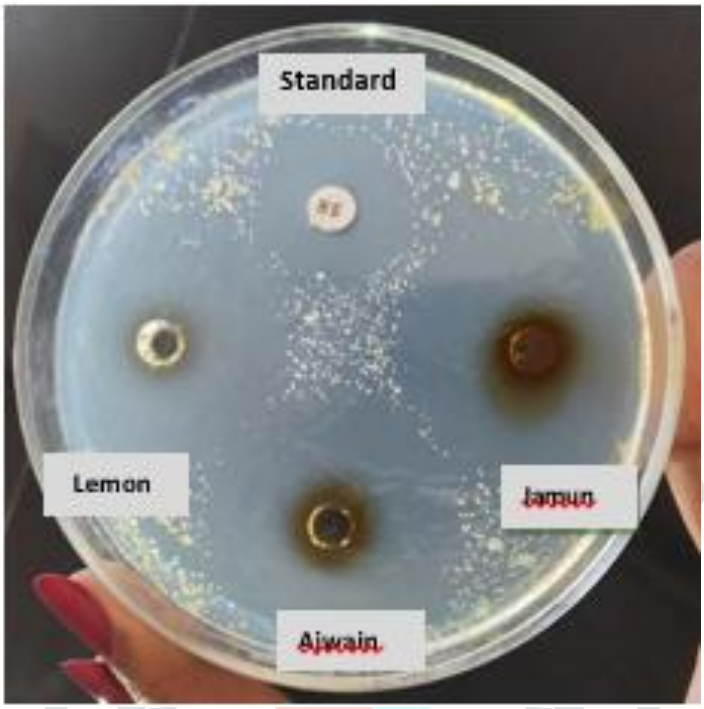
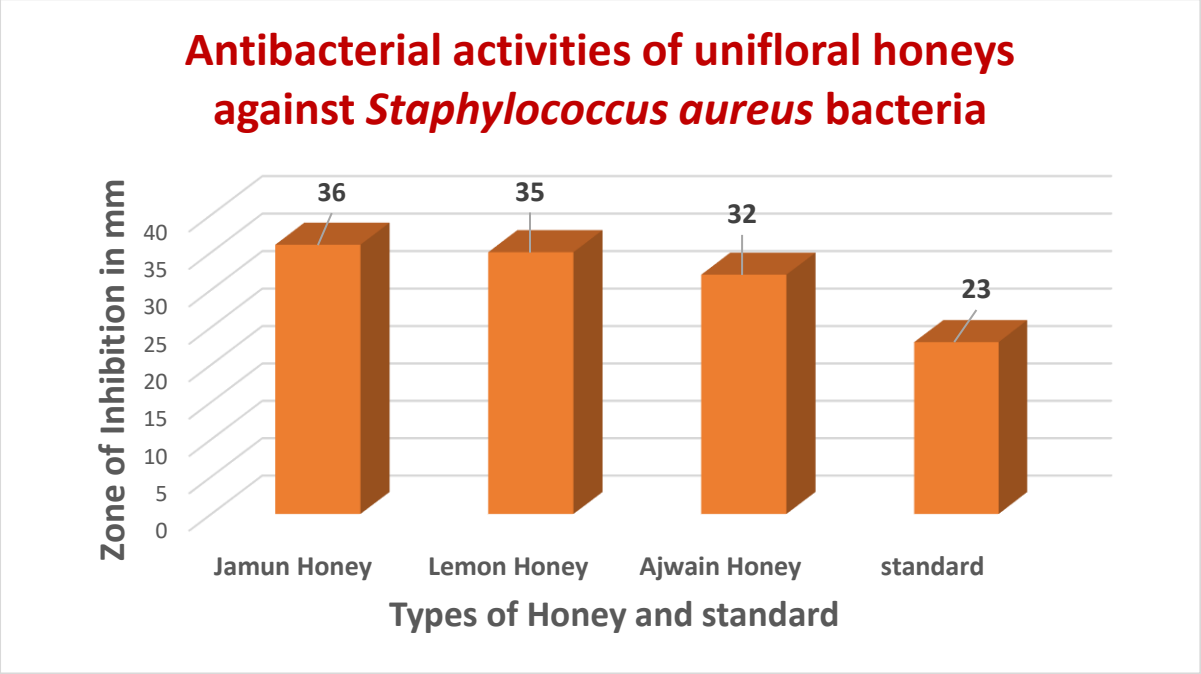


Table 1: The antibacterial activities of the different honeys

Type of Honey	Mean diameter of zone of inhibition(mm) of honey	Diameter of zone of inhibition(mm) of standard
Jamun Honey	36	23
Lemon Honey	35	23
Ajwain Honey	32	23

Fig 1: The antibacterial activities of the different honeys



From the given experiment it was found that, as the Jamun honey has highest zone of inhibition, it has maximum antibacterial property in comparison with the other two honey types. Ajwain honey showed lowest zone of inhibition suggesting that it has least antibacterial property out of the three honeys taken as sample in the present experiment.

CONCLUSION:

It can be conclude that honey has effect on growth of bacteria. Jamun honey showed highest antibacterial activity. It can be used as an effective natural source for the inhibition of growth of bacteria. From the current investigation it can be concluded that the honeys samples selected have medicinal values and are resistant for the diseases caused by this pathogen. The present study verified the traditional use of honeys for various human ailments especially for various infectious diseases. Thus these honeys could be utilized as an alternative medicinal source and useful as antimicrobial drugs. It is recommended that the above mentioned honeys are highly important as far as their medicinal values are concerned. So along with their further exploration for the mention strain, other strains should also be used in order to test out their significance.

REFERENCES:

1. Levy SB, Marshall B. Antibacterial resistance worldwide: causes, challenges and responses. Nat Med. 2004; 10:122–129.
2. Mandal S, Pal NK, Chowdhury IH, Deb Mandal M. Antibacterial activity of ciprofloxacin and trimethoprim, alone and in combination, against *Vibrio cholerae* O1 biotype El Tor serotype Ogawa isolates. Polish J Microbiol. 2009; 58:57–60.

3. Lusby PE, Coombes AL, Wilkinson JM. Bactericidal activity of different honeys against pathogenic bacteria. Arch Med Res. 2005; 36:464–467.
4. Mundo MA, Padilla-Zakour OI, Worobo RW. Growth inhibition of foodborne pathogens and food spoilage organisms by select raw honeys. Int J Food Microbiol. 2004; 97:1–8.
5. Van den Berg AJ, Van den Worm E, Van HC, Halkes SB, Hoekstra MJ, Beukelman CJ. An *in vitro* examination of the antioxidant and anti-inflammatory properties of buckwheat honey. J Wound Care. 2008;17:172–178.
6. Molan PC. The evidence supporting the use of honey as a wound dressing. Int J Low Extrem Wounds. 2006;5:40–54.
7. Simon A, Traynor K, Santos K, Blaser G, Bode U, Molan P. Medical honey for wound care - still the 'Latest Resort' Evid Based Complement Alternat Med. 2008 doi: 10.1093/ecam/nem175.
8. Cooper RA, Molan PC, Harding KG. Honey and gram positive cocci of clinical significance in wounds. J Appl Microbiol. 2002;93:857–863.
9. Cooper RA, Halas E, Molan PC. The efficacy of honey in inhibiting strains of *Pseudomonas aeruginosa* from infected burns. J Burn Care Rehabil. 2002;23:366–370.
10. P. C. Molan, "The antibacterial activity of honey," Bee World, vol. 73, no. 1, pp. 5–28, 1992.
11. B. Pieper, "Honey-based dressings and wound care," Journal of Wound, Ostomy and Continence Nursing, vol. 36, no. 6, p. 589, 2009.
12. Allen KL, Molan PC and Reid GM (1991). A survey of the antibacterial activity of some New Zealand honeys. J Pharm Pharmacol., 43(12): 817-822.