RESEARCH ARTICLE

The antimicrobial activity in the crude honey samples from the Chalisgaon region

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ABSTRACT

The present research work was carried out to study the antimicrobial activity of honey sample collected from chalisgaon region during 2012 to 2015. During study, four crude honey samples were applied to evaluate the antifungal and antibacterial study on the basis of zone of inhibition. It was concluded that *Escherechia coli* and *Bacillus subtillis* are more susceptible than other experimental bacteria. In the antifungal activity, the *Aspergillus terrens* had shown more susceptibility than other experimented fungi.

Keywords: Crude honey, Antibacterial activity, antifungal activity, Zone of inhibition.

INTRODUCTION

Honey is the natural sweet substance produced by honey bees from nectar or blossoms from the secretion of living parts of plants. It is most primitive and nourishing agent. It is unique mixture of invert sugar (62-83%) sucrose (0-8 %), dextrin (0.8-7%), vitamin together with water and trace of other nutrients (Somai *et al.*, 1994; Mandal and Mandal, 2011).

In the medical field, antimicrobial agents are responsible to minimize the various microbial diseases. However, day by day resistance power reduced the effect of antibiotics and shows very serious problem to the public health (Mandal *et al*., 2010). For this reason, it is a need to developed new antimicrobial tactics and thus this situation has led to a re-evaluation of the therapeutic use of ancient remedies, such as plants and plant-based products, including honey (Basualdo *et al.*, 2007; Mandal *et al*., 2009,2010; Mandal and Mandal, 2011). Recently, many researchers have reported the antimicrobial activity of honey and found that natural crude honey has some broad-spectrum antimicrobial activity when tested against pathogenic bacteria, fungi and food spoilage microorganisms (Basualdo *et al.,* 2007; Levy and Marshall, 2004; Lusby *et al*., 2005; Mundo *et al*., 2004).

The antimicrobial activity is variable among the different honey depending on its geographical, seasonal and botanical source as well as through harvesting, processing and storage conditions. According to Mavric *et al.* (2008), the antimicrobial activity of honey is recognized largely by osmolality, pH, Hydrogen peroxide production and the presence of other photochemical components eg. methylglyoxal.

As per the importance of honey in medical and pharmaceutical field it is necessary to evaluate the various components which show the antimicrobial activity in the honey samples. Here we report initially the present status of the antimicrobial activity against the crude honey samples of *Apisdorsata* originating from nearby area of Chalisgaon region.

MATERIALS AND METHODS

Honey sample: Natural crude honey samples were collected from the tribes from five different sites (S1, S2, S3, S4 and S5) of Chalisgaon region. They were stored in tightly closed glass bottles wrapped in aluminum foil and kept at room temperature. Each honey solution was prepared just before use to insure that there was no loss of hydrogen peroxide. Sample of 10 gm. of honey was added to 10 ml distilled water and mixed to achieve 50 % (w/V) solution.

Determination of antimicrobial activity*:* For this study four bacterial strains such as *Escherichia coli, Pseudomonas auriginosa, Lactobacillus sporogense* and *Staphylococcus aurius* and three fungal strains *Aspergillus fumigense, Aspergillus terrens, Penicilium chrysogenum* were used. The antimicrobial activity of honey sample was evaluated by agar diffusion method. 100µ of diluted bacterial suspension were spread onto the surface of plate L.B. agar medium. Wells (0.6mm in diameter) were cut from agar with a sterile cork borer. Then 100µ of honey solution were added to each well. Water was used as negative control in all experiments. All the Plates were incubated at 37^0C for 24 hrs. Then antimicrobial activity was evaluated by measuring the diameter of the clear inhibition zone expressed in millimeters (mm) around each tested substance.

RESULTS

The antimicrobial effect of honey has been reported earlier by a number of workers (Sheikh *et al*, 1995; Basualdo *et al*, 2007; Temaru *et al.*, 2007; Mandal *et al*., 2009, 2010; Chauhan *et al*., 2010). The present study was carried out to determine the antimicrobial effects of honey around the Chalisgaon region. Around five selected sites, four bacterial strains were tested with 50 % (w/V) honey solution; this killed the inocula of all bacteria at specific level which shows the antibacterial effect against the selected honey sample (Table1). The zone of inhibition of selected bacteria showed variation in five different experiments when treated with the honey sample (fig. 1). *E. coli* and *B. subtillis* showed effect in the form of zone of inhibition is 14.9 and 14.8 mm respectively while in *L. sporogens* and *P. auriginosa* it vary as 10.4 and 9.4 respectively. These observations also supported by earlier workers (Cavanagh *et al.,* 1968; Sheikh *et al*, 1995; Levy and Marshall, 2004; Basualdo *et al.,* 2007; Chauhan *et al.*, 2010; Ghanem, 2011).

Fungi when tested with honey diluted to 50%, which showed since this killed the entire inocula of all fungi at specific level which shows the antibacterial effect against the selected honey sample. (Table: 2). The zone of inhibition of selected fungi showed variation in every experiment when treated with the honey sample. *A. terrens* form 7.2 mm zone of inhibition while in *A. fumigense* forms 4.8 mm, it shows that *A. terrens* is more susceptible than other two.

Table 1: Antibacterial activity of honey

Sr. No.	Microorganism	Zone of inhibition(mm)					Mean
		S1	S2	S3	S4	S5	
1	*Bacillus subtillis*	16	14	19	12	12	14.6
2	*Escherechia coli*	18	13	15	15	13	14.8
3	*Lactobacillus sporogens*	12	12	08	10	10	10.4
4	*Pseudomonas auriginosa*	17	08	06	06	10	9.4

Table 2: Antifungal activity of honey

Sr. No.	Microorganism	Zone of inhibition(mm)					Mean
		S1	S2	S3	S4	S5	
1	*Aspergillusfumigense*	07	04	05	03	05	4.8
2	*Aspergillusterrens*	08	08	07	07	06	7.2
3	*Peniciliumchrysogenum*	-	-	-	-	-	--

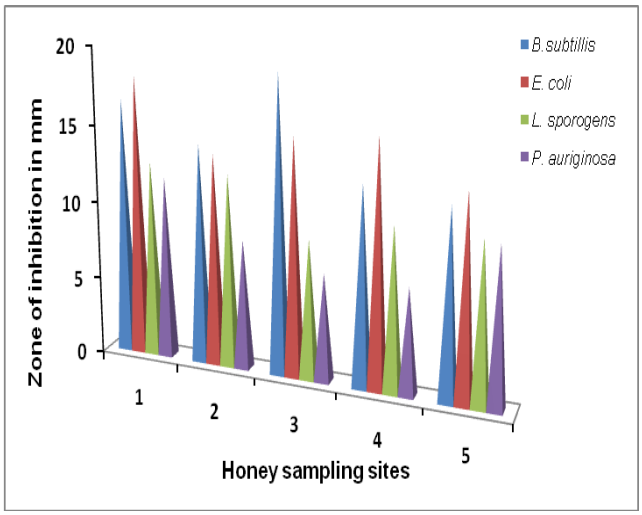

Fig 1: showing antibacterial activity of honey

These results also supported by many workers (Haffeejee and Moosa, 1985; Jeddar *et al.,*1985; Kim *et al.,*1995;Sheikh *et al*, 1995; Hasanain, 1997; Levy and Marshall, 2004; Chauhan*et al.,*2010;Ghanem, 2011).

CONCLUSION

In antibacterial activity, it is concluded that *E.coli* and *B.subtillis* are more susceptible than *L. sporogens*and *P. auriginosa* while in antifungal activity, *A.terrens* is more susceptible than *A.fumigense*. The fungus, *P.chrysogenum* shows no any inhibitory activity against the honey samples. This preliminary research may be informative for further research especially in nutritional supplements and cosmetics as well as for pharmaceutical and medical use.

At present a number of honeys are available in the market with standardized levels of antibacterial activity. It may be noted that crude honey possesses excellent antibacterial activity comparable to the commercial honeys. Therefore it is necessary to study other locally produced crude honeys for their antimicrobial activities.

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