ABSTRACT

Some venoms and their isolated compounds have been shown to have antibacterial properties. Toxicity of wasp venom and bee venom is known to man since ages, which varies from mild inflammations to death. In both the cases, the venom are synthesised in the poisonous sac of honeybee (Apis dorsata) and garden wasp (Ropalidia marginata). In the present study, the toxic effect of honey bee and garden wasp venoms was carried out in-vitro on bacterial source obtained from buccal cavity of domestic animals (buffalo, cow, cat, hen and goat). Results showed honey bee venom has significant bacterial effect and inhibition zone in cow, cat, and buffalo than wasp venom which had effect only in cow and cat and nil effect in buffalo. Also, the results determined in the venoms of bee and wasp doesn’t have the noticeable effect on the bacteria of goat and hen.

KEY WORDS: Antibacterial, venom, Ropalidia marginata, Apis dorsata.

INTRODUCTION

HONEY BEES

Honey bees are the social insects. They are recognized as the important insect pollinators and thus causes increase in the productivity of food plants in earth (Free, 1993; Jyothi, 1994; Chaudary et al., 2001; Sharma and Gupta, 2001). Apart from being a pollinators, they are lot of beneficial products such as honey, bee wax, royal jelly, pollen, venom and propolis
(Burendra et al., 2011) these poisonous gland are found posterior part of the abdomen (Owen and Bridges, 1984). Dufours and venom gland (poisonous gland) are associated with sting apparatus of the worker produce version. The worker sting only once, which leads to the death.

**ROPALIDIA MARGINATA**

Just like honey bees, they are also social insects. There is a good organization characterized by division of labour and dominance hierarchy is very well established (C. Vinutha, 2002). The nest is constructed by R. marginata are papery in texture, built by them with material collected by scraping cellulose of plants and woods. Generally they build nest on the cuves of undisturbed buildings, twigs and other plants (Gadagkar, 1980). The hexagonal cells of comb contain the different stages of their brood *i.e.*, eggs, larvae of different stages, pupae. Generally nests are arboreal, irregular in shape (C. Vinutha, 2002).

Generally venom contains 88% water at least 18 pharmacologically active components have been described so far; including various enzymes, peptides and amines (Dotimas and Hider, 1987). The study of social Hymenoptera (Bees, wasps and ants) venom proteins is of great interest. They generally cause allergic reactions in humans and in turn result in pain, local inflammations (Dotimas and Hider, 1987; Hoffman, 1977), itching and irritation as immediate responses that after some hours attenuated (Golden et al., 1989). Venom has interesting pharmacological properties (Dong et al., 2007) and is used in the treatment of various health conditions such as treatment of various health conditions such as arthritis, rheumatism (Putz et al., 2006), pain (Kim et al., 2003), cancerous tumors (Russel et al., 2004) and skin diseases.

**MATERIALS AND METHODS**

**Preparation of Bee venom and Wasp venom**

4-5 live bees and wasps were collected separately and were immobilized by quick freezing at -20 °C. The sting of both wasp and honey bee was carefully measured using micrometer and was recorded later the venom reservoirs were extracted by dissecting the stinging apparatus and was disrupted under rapid pressure by using sterile glass rod. These venom samples were later dipped with sterile paper discs and were placed separately in the cultured bacterial plates and were incubated at 37°C for 24-48 hours for observation of zone of inhibition. The results was recorded based on the diameter of inhibition zones observed.
Collection of bacterial isolates
The isolates used in the present study were collected from the buccal cavity of cow, cat, hen, buffalo and goat using sterile swabs.

Pure culturing of microbial strains
The sterile swabs collected from different domestic animals were then streaked on the respective petriplates containing the nutrient Muller Hinton agar media in aseptic condition. Nutrient Muller Hinton agar media composed of 0.45g beef extract, 3.93g peptone, 0.337g starch, 3.82g agar, dissolved in 225ml of distilled water and pH was maintained at ± 7.4. The petriplates with culture were incubated in incubator at 37°C for a period of 24 hours and stored at 4°C for further use.

RESULTS AND DISCUSSION
In the present investigation, the bacterial flora obtained from goat, hen and buffalo was found to be Gram negative, whereas a bacterial flora of cow and cat was found to be Gram positive. The venom from honey bee (Apis dorsata) showed high antimicrobial activity and exhibited larger zone of inhibition in the bacterial flora of cow (0.9cm), cat (0.6cm) and buffalo (0.85cm) and nil in bacterial flora of goat and hen (fig. 1 and table.1).

The venom of wasp Ropalidia marginata showed lower inhibition zone against bacterial flora of cow (0.65cm) and cat (0.75cm) and nil in the bacterial flora of goat, buffalo and hen (fig. 2 and table.1).

The present investigations showed that antimicrobial activity of venom of Apis dorsata and Ropalidia marginata was almost equal to the effect of bacterial flora of cow and cat and slight high effect for the venom of bees on the bacterial flora of goat which showed nil effect for the venom of wasp on the goat. The antimicrobial activity of bee venom was documented in earlier studies. Park et al., 2013 clearly demonstrated that honey bee venom inhibited the growth of seventeen Gram-positive and partially Gram-negative out of 44 bacterial strains isolated from bovine mastitis in Korea. The antimicrobial activity of honey bee venom may be due to the presence of several peptides like melittin, apamin, adolapin, mast cells, degranulating peptide, enzymes, biologically active amines and non-peptide components. In earlier study Hegazi et al., 2002 showed that bee products were less effective against E.coli, the current study provides evidence that bee venom has antibacterial activity against both
Gram-positive and Gram-negative bacteria with no significant differences between both groups.

Investigators have reported that the level of antibacterial activity against Gram-negative and Gram-positive bacteria is different among different antibacterial agents. The experimental data of current study confirms the previous work which suggested that bee venom can inhibit growth and survival of some bacterial strains. Further studies are needed to standardize the potential agents against pathogenic bacteria.

Table 1 Comparison of zone of inhibition between bee venom and wasp venom(cm)

<table>
<thead>
<tr>
<th>Sources</th>
<th>cow</th>
<th>Cat</th>
<th>Buffalo</th>
<th>Goat</th>
<th>Hen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honey bee</td>
<td>0.9</td>
<td>0.6</td>
<td>0.85</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wasp</td>
<td>0.65</td>
<td>0.75</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Fig 1: Control of microbial strains obtained for different sources
Fig 2: Inhibition zones of honey bee venom in buffalo, cat and cow

Fig 3: Inhibition zones of wasp venom for cat and cow

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