Executive summary of minor project

Title: Artificial feeding of honey bees, *Apis cerana* with fruit juice and leaf extracts to produce express honey and to analyze the honey for its anti-microbial, antioxidant and anti-diabetic activities on *Streptococcus pneumonia* and *Staphylococcus aureus*

In the present investigation the antibacterial effect of honey and both pure and methonolic extracts of *Punica granatum* on microorganisms like ***Streptococcus pneumonia, Staphylococcus aureus, Klebsiella, Proteus and E.coli*** was observed. The extracts of skin, pith, stem, seed and leaf were used. The zone of inhibition was compared to that of the antibiotics like Ampicillin, Cephalexin and Azithromycin. The phytochemical screening of honey samples were conducted for alkaloids, saponins, flavones, tannins, phenols, carbohydrates, glycosides and amino acids using standard biochemical tests. The antioxidant activities of these products were also estimated for different concentrations using quecertin as the standard.

The pure honey samples A and B did not show any significant zone of inhibition comparable to the zone of inhibition shown by the antibiotics. In the present study the honey samples A and B produced by *Apis cerana* honey bees from the apiary did not show any effective microbial inhibiting property used in the experiment. It can be inferred from the present study that though the antimicrobial property of honey is an established fact not all types of honey have similar effects as its antimicrobial property is dependent on the phytochemicals from the botanical source of nectar collection.

The pure extracts of *Punica granatum* when used, a zone of inhibition of 7 mm was seen for the pure extracts of the pith and 5 mm for the methanol extract of the seed against *S. aureus* bacterium; 7 mm for the pure extracts of the pith and 6 mm for the skin for Proteus which was comparable to the zone of inhibition for the Azithromycin antibiotic, thus pomegranate extracts could be used effectively against *Proteus*.

The methanol extracts of *Punica granatum* showed a zone of inhibition of 5.2 mm for skin and 3.5 mm and 4.7 mm for stem for *Proteus. Proteus* did not show any zone of inhibition for the antibiotics Cephalexin and Ampicillin. None of the other extracts, both pure and methanol had any significant inhibitory effect on *E. coli*, *Streptococcus pneumonia*, *Staphylococcus aureus and Klebsiella*. The pure extracts of the pith, skin stem, leaf, seeds and honey samples exhibited a higher free radical scavenging activity as compared to and the standard quecertin.

Honey is a natural holistic food product, easily digestible by young and old alike and also found to have a number of antioxidants like alkaloids, tannins, polyphenols, flavonoids, saponnins etc. *Punica granatum* is a source of several alkaloids and steroids and its medicinal properties are well documented. The pith of the pomegranate is an important source of the antioxidant punicalagin.

The significant findings of this investigation are:

- Honey is a good source of antioxidants and hence has a high ability to scavenge and neutralize harmful free radicals. However, its antimicrobial efficacy have to be clinically established before it can be recommended as an alternative or complementary remedy for the common ailments affecting man as its bactericidal activity depends on the floral source of nectar collected by the bees,
- The therapeutic efficacy of extracts of *Punica granatum* in bacterial infections is promising in case of infections by *Proteus*, like the skin and urinary tract infections.
- An increase in dietary intake of honey and pomegranate may prove to have a long term benefits in preventing or reducing the onset of diseases because of their antioxidant properties.