Preliminary Studies on Antioxidant Activity of Extract Obtained from Black Cartenter Ant Camponotus compresses (Fab.,) (Hymenoptera: Formicidae)

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***Abstract*— Different types of toxins, debris and reactive oxygen species, commonly known as free radicals, are generated during metabolism by natural cell death, infections, pollution etc. The side effects of many drugs and medicines are also due to generation and accumulation of such free radicals. They cause many histopathological and physiological disorders leading to degenerative diseases. Thus, these wastes are to be disposed off and removed as early as possible for normal functioning of the body and healing process. In modern medical science it is believed that antioxidants, also known as free radical scavenging agents play an important role. Exogenous intake of antioxidants helps the body to scavenge free radicals effectively and to promote natural functioning of all body systems. In this present study, In vitro antioxidant activity of C. compressus extract was determined using DPPH radical scavenging method. A concentration dependent inhibition of DPPH radicals was observed with maximum activity (89.24 ± 0.005) at 4 mg/ml dose followed by other concentration tested, 3 mg/ml (79.24%), 2 mg/ml (65.48%) and 1 mg/ml (54.13%). At still higher concentration, 5 mg/ml (89.11%), a rather lower, and statistically at similarity, inhibition was noticed than the preceding concentration. The antioxidant activity of C. compressus may be due to the presence of bioactive peptides. Further detailed studies on the antioxidant activity of C. compressus extract observation on animals are needed to define the mechanism of antioxidant activity.**

***Index Terms*— Camponotus compressus, Insect extract, Antioxidant activity, DPPH Radical scavenging method.**

I. INTRODUCTION

Insects and the substances obtained from them have been used as medicinal assets by human cultures all around the world. Science has already proven the existence of immunological, analgesic, antibacterial, diuretic, anaesthetics, and antirheumatic potentials in the bodies of insects. Several authors have surveyed the therapeutic potential of insects, either recording traditional medical practices or by employing insects and their products at the laboratory and clinical level. Therefore, insects seem to comprise an almost inexhaustible source for pharmacological research (Yamuna and Raja, 2019).

Ants serve a very useful purpose in nature. Despite their tiny size, they have made themselves extremely dominant and effective group by their huge population size, studiousness, survival even in very odd situations, a division of labor and excellent intra colony cooperation. Dunn and Sanchez (2002) have argued for the use of social insects as medicine, particularly ants, by comparing their social behavior and nature to those of human beings, they have evolved the use of different antibiotics and fungicides that can be directly used by humans.

Camponotus compressus is widely distributed in subtropical and tropical regions across the world (Holldobler and Wilson, 1990) The previous *C. compressus* studies have focused on physiological and pharmacological aspects and have demonstrated that *C. compressus* constituents have favorable antibacterial, antioxidant and anti-hyperglycaemic (Pradeep *et al*. 2012).

Additionally, this insect has been used in traditional Chinese medicine (TCM) as an important biomedical component for the treatment for hundreds of years.

Natural compounds rich in flavonoids, vitamins, polyphenols, and anthocyanins are reported to possess remarkable anti-oxidant activity. Therefore, the search for natural antioxidants as alternatives to synthetic ones is on the rise and of great interest

among researchers. Bioactive peptides present in the hemolymph of insects are known for their antioxidant ability (Park *et al.*, 2001). Thus in this study on the antioxidant activity of extract obtained from the selected ant species was analyzed.

II. MATERIALS AND METHOD

A. Sample Collection

All ant samples used in this study were collected at ideal stages of their lifecycles at which they are used for medicine. Fresh samples of these species were collected from the chosen study site which was preferentially wild habitats and local markets. Specimens were collected with the help of local informant, mostly the local residents of the collection site skilled in wild insect harvesting. The ants were collected from various, Agricultural fields, vegetable gardens and grasslands. The collected ant species were preserved for identification.

B. Identification

The preserved species for identification were packed in specimen tubes containing 70% alcohol and submitted to Zoological Survey of India (ZSI), Shillong and Kolkata for identification. The specimens were taxonomically identified and classified by entomologists from ZSI, Shillong and Kolkata.

C. Extract preparation

The collected ants (C. compressus) were air-dried at room temperature (26°C) for 2 days and ground to a uniform powder. Ant powder (1000 g) was taken in a conical flask and 3L of Ethanol was added. The flask plugged with cotton wool and then kept on a rotary shaker at about 200 rpm for 24 hrs. After 24 hrs, obtained supernatants (extracts) were filtered first through a whatmann filter paper No.42 (125 mm) and then through cotton wool, solvents were concentrated using a rotary evaporator with the water bath set at 40°C.

D.DPPH Activity

A series of concentrations of extract (1-5 mg/ml) were prepared in normal saline. One ml of each dilution was added to 2 ml of 0.15 Mm solution of DPPH in ethanol. Ethanol (1 ml) was used as experimental blank (control). The mixture was incubated, in dark, for 30 min at room temperature to permit maximum reduction of free radicals followed by measuring the optical density (OD) at 517 nm using spectrophotometer (SYSTRONICS, INDIA). The lower absorbance (OD) indicates higher antioxidant or free radical scavenging activity due to quenching of the deep violet color of DPPH and development of yellowish colouration. As a standard Antioxidant (positive reference) vitamin C (0.01-0.05 mg/ml) was employed. The antioxidant activity was expressed as per cent inhibition of DPPH which was calculated from the following equation:

Inhibition (%) = 1 O.D. value of Sample/ O.D. value of Control x 100

III. RESULT AND DISCUSSION

Ant extract showed DPPH inhibition in concentration dependent manner. Maximum inhibition (89.24%) was observed with the 4 mg/ml dose of extract which was found to be higher as compared to the inhibition at other concentrations; 5 mg/ml(89.11%), 3 mg/ml (79.24%), 2 mg/ml (65.48%) and 1 mg/ml (54.13%) respectively. However, the free radical scavenging activity of Vitamin C also showed a similar pattern of inhibition at 0.01-0.05 mg/ml was found to be 59.02%, 72.41%, 84.18%, 98.62% and 98.81%, respectively (Table 1). There are several methods developed in order to define the antioxidant activity of the bioactive compounds among which DPPH scavenging is the most popular one (Jun *et al.* ,2011). DPPH a standard free radical at room temperature and accepts an electron or hydrogen molecule to become a diamagnetic molecule (Sharma and Bhat 2009). The effects of DPPH on antioxidants are thought to be due to its hydrogen donating ability. The present study did show that the extract of C. compressus has the proton donating ability and could serve have free radical scavengers (Table 1). The same was evidenced by Pradeep *et al.* 2012. In his study he reported that the antioxidant activity of *C. compressus* may be due to the presence of bioactive peptides. Further detailed studies on the antioxidant activity of *C. compressus* extract observation on animals are needed to define the mechanism of antioxidant activity. The bioactive extract can be used as antidiabetic drug with pharmacological and clinical studies

IV.CONCLUSION

The most potential biological property of bio-therapeutic agents is their antioxidant and free radical scavenging activity which helps in getting rid of debris and toxins generated by natural cell death, infections, pollution etc. and to promote natural functioning of all body systems. In vitro experiment (DPPH radical assay) revealed that ant *C. compresses* extract possesses enough activity of this kind.

Table 1: Antioxidant activity of C. compressus extract

S. No	Concentration of *C. compressus* Extract (mg/ml)	DPPH inhibition(%)	Concentration of Vitamin C(mg/ml)	DPPH inhibition(%)
1	1	54 ± 0.008	0.01	59.02 ± 0.003
2	2	65 ± 0.005	0.02	72.41 ± 0.004
3	3	79 ± 0.004	0.03	84.18 ± 0.116
4	4	89 ± 0.005	0.04	98.62 ± 0.001
5	5	89 ± 0.003	0.05	98.81 ± 0.0005

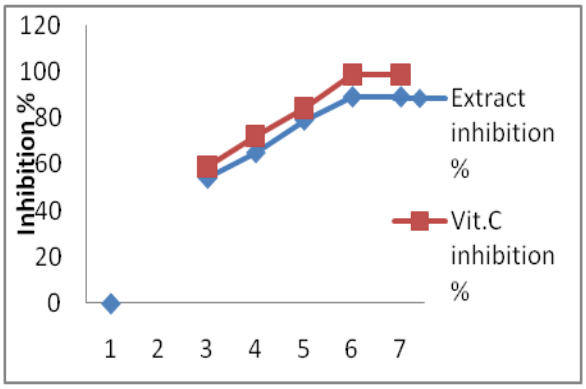

Fig. 1: Antioxidant activity of C. compressus extract

REFERENCES

[1] Yamuna. R and Raja. S, "Evaluation of antimicrobial activity of different solvent extracts of *Camponotus compressus" IJRAR:* 786PP. (2019).

[2] Dunn and Sanchez. "Insects as medicines: the ant and the grasshopper," http://www.robrdunn.com/ (2002).

[3] Hölldobler and Wilson "The Ants" Springer, Berlin, 732 pp. DM 198. (1990).

[4] Pradeep AR, Rao NS, Agarwal E, Bajaj P, Kumari M, Naik SB. Comparative evaluation of autologous platelet-rich fibrin and platelet-rich plasma in the treatment of 3-wall intrabony defects in chronic periodontitis: A randomized controlled clinical trial. J Periodontol;83:1499-507.(2012).

[5] Park M.K., Petersen,O.H. and Tepikin,A.V. The endoplasmic reticulum as one continuous Ca2+ pool: visualization of rapid Ca2+ movements and equilibration. EMBO J., 19, 5729–5739. (2001).

[6] Jun, Kim, Kim. The evaluation of the water quality in coastal boundary on tidal flat J. Korean Soc. Mar. Environ. Energy, 14 ,pp. 1-10. (2011).

[7] Sharma, O.P. and Bhat, T.K. DPPH Antioxidant Assay Revisited. Food Chemistry, 113, 1202-1205. (2009).