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Research article

IN VITRO ANTIOXIDANT ACTIVITY ASSESSMENT ON ALCOHOLIC EXTRACT OF CYANOBACTERIA CULTURES FROM SPIRULINA PLATENSIS

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ABSTRACT

The antioxidant supplementation such as vitamin C, E, A and beta carotene etc, has proven to prevent the process of ageing caused by free radicals. Antioxidants either prevent free radical production or counteract the impeding damage by doing so they are involved in the protection and prevention of cellular damage which is the common pathway for cancer, aging and much disease. The cyanobacteria is a blue green micro algae believed to be a rich antioxidant source, found in abundance in *Spirulina platensis* is evaluated for antioxidant potential by modern *in vitro* techniques. METHODS the alcoholic extract of cyanobacteria is studied by *in vitro* Lipid Peroxidation inhibition assay (LPO), The nitric oxide (NO) free radical scavenging activity and the determination of the DPPH (one, 1-diphenyl-2-picrylhydrazil) radical scavenging activity in concentrations which ranged from 1.95 g/mg to 500 g/mg in a geometric progression using spectrophotometer **Results:** The IC-50 % inhibition value of cyanobacteria by LPO is 102.70 mcg/ml, DPPH is 63.35 mcg/ml and by NO is 8.80 mcg/ml **CONCLUSION** The alcoholic extract of corynebacterium culture from *Spirulina platensis* exhibited potent NO free radical scavenging activity with mild activity on DPPH and LPO inhibition assay.

Keywords: *Spirulina platensis*, Cyanobacteria, Antioxidant activity

INTRODUCTION

In vitro studies in biomedical research is far more advanced, these studies permits a more detailed, reproducible and convenient analysis that can be done with whole organism¹. Day to day free radicals production in the body causes oxidative damage to the system which are responsible for various diseases. These damages

are counteracted often by exogenous substance or nutrients which are now identified as antioxidants. These antioxidants scavenges free radicals thus prevent damage to the body².

Hence there is a great need to identify the rich exogenous source of antioxidant which would prevent and repair damage caused by free

radicals³. Cyanobacterium is a blue green algae found in aquatic and terrestrial habitat. In the present study the antioxidant potential of cyanobacterial isolates from *Spirulina platensis* has been evaluated against the *in vitro* scavenging of the NO radical activity, Lipid Peroxidation (LPO) inhibition and the 1-Diphenyl-2-Picrylhydrazil (DPPH) inhibition antioxidant assays.

MATERIALS AND METHODS

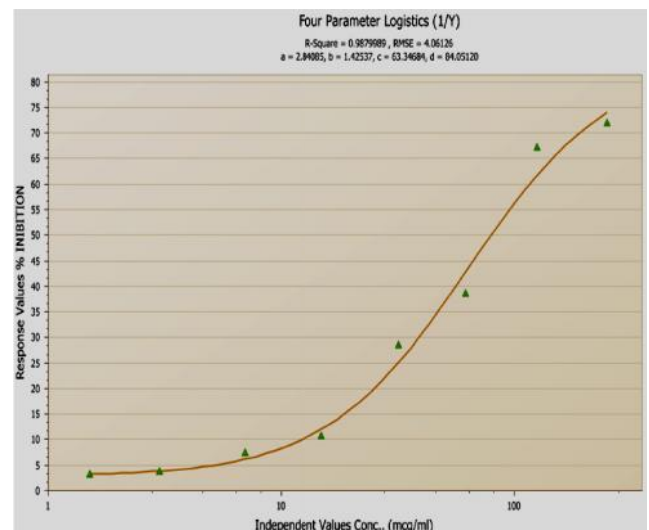
This study was done on February 2013 at the Department of Pharmacology and physiology at Mahatma Gandhi Medical College and research Institute Pillaiyarkuppam, Pondicherry, India. *Spirulina platensis* were collected from department of marine biotechnology, Bharathidasan university, Tiruchirapalli. The cyanobacteria isolates were extracted from mid log phase culture of *S.platensis*, 1gm weight of cyanobacteria were homogenized with 75% alcohol using mortar and pestle. The clear extract was separated and dried using flash vacuum concentrator. The alcoholic extract was then subjected to *in vitro* scavenging of the NO radical activity⁴, Lipid Peroxidation (LPO) inhibition⁵ and 1-Diphenyl-2-Picrylhydrazil (DPPH) inhibition antioxidant assays⁶ analyzed by spectrophotometer.

Statistical Analysis

All the *in vitro* experiments were performed in triplicate. The IC₅₀ values were calculated by linear regression analysis using an experimental software multiplex

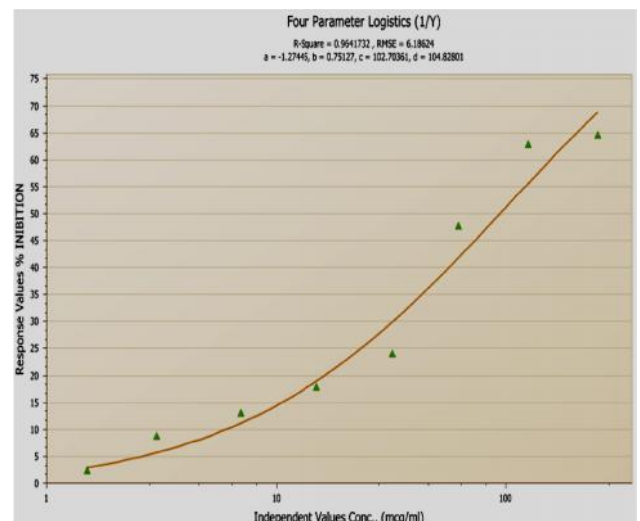
RESULTS

In the present study, the percentage inhibition of the cyanobacteria extract was analyzed by the *in vitro* Lipid Peroxidation inhibition assay (LPO), The nitric oxide (NO) free radical scavenging activity and by the determination of the DPPH (one, 1-diphenyl-2-picrylhydrazil) radical scavenging activity in various concentrations which ranged from 1.95 g/mg to 500 g/mg in a geometric progression



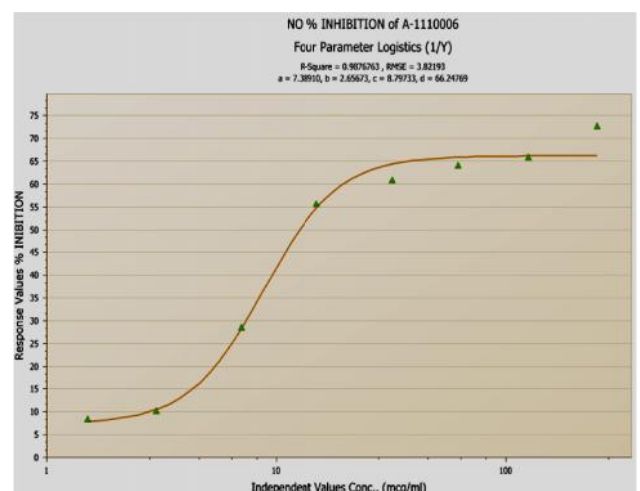
IC₅₀ = 63.35mcg/ml

Fig.1: DPPH-1,1-diphenyl-2-picrylhydrazil radical % inhibition of Cynobacterium



IC₅₀ = 102.70 mcg/ml

Fig.2: LPO - Lipid peroxidation % inhibition of Cynobacterium



IC₅₀ = 8.80 mcg/ml.

Fig.3: NO - Nitric oxide % inhibition of Cynobacterium

Table.1: Inhibition % of antioxidant activity

Method	Corynebacterium (IC-50 mcg/ml)	Vitamin-E (IC-50 mcg/ml)
LPO	102.70	27
DPPH	63.35	14.4
NO	8.80	18.5

DPPH - 1,1-diphenyl-2-picrylhydrazil radical,
LPO - Lipid peroxidation, NO - Nitric oxide

DISCUSSION

Cyanobacteria is a prokaryotic and photosynthetic organism which has recently caught attraction world wide as a model organism for research exploration⁷. In the present study *Spirulina platensis* a common source of cyanobacteria available as food is believed to be an excellent source of antioxidant activity is assessed by modern scientists *in vitro* techniques. The *in vitro* analysis by lipid peroxidation assay and DPPH assay revealed to minor activity when compared to that of Vitamin E whereas the nitric oxide free radical scavenging activity is superior with IC 50 values of 8.80 mcg/ml compared to that of vitamin E IC-50 values 18.85mcg/ml. The micro algae by its significant free radical scavenging action minimize the production of pro-inflammatory cytokines which would release from macrophages and spllenocytes by NF-kB pathway⁸. the role of free radicals induced oxidative stress has been implicated in various pathological conditions and ageing⁹. The imbalance in antioxidant and free radical cause disease conditions by two ways, one by mitochondrial oxidative stress and second by inflammatory oxidative condition¹⁰. In the recent years the synthetic flavanoids has come to limelight as potent antioxidants but still along with its positive biological effects some flavanoids also exhibited toxic effects like breast cancer (oestrogenic effects), liver disease, anemia and dermatitis¹¹. The cyanobacteria is a microalgae with rich polyunsaturated fatty acids, proteins, vitamins and minerals¹². The present study has proved the presence of another rich

biological activity of micro algae cyanobacteria as a potent antioxidant.

CONCLUSION

For the current generation strenuous life style and food habits, its doubtless that antioxidant supplementation is ideal. At the same time it is important to understand that free radical generation and counteracting antioxidant production should be in balance. The availability of modern synthetic antioxidants could be deleterious, hence as far as possible dietary source of antioxidants with reduction in exposure to free radical source (pesticides, pollution etc.,) *Spirulina* for generations has provided such benefit, the present study has scientifically proven the micro algae cyanobacteria from *Spirulina* has antioxidant activity.

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